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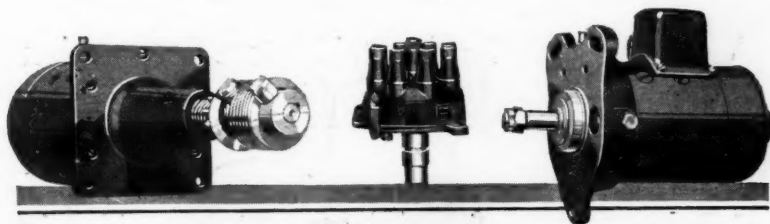
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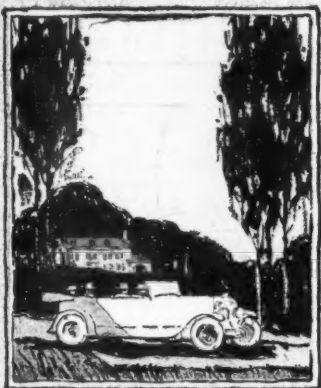
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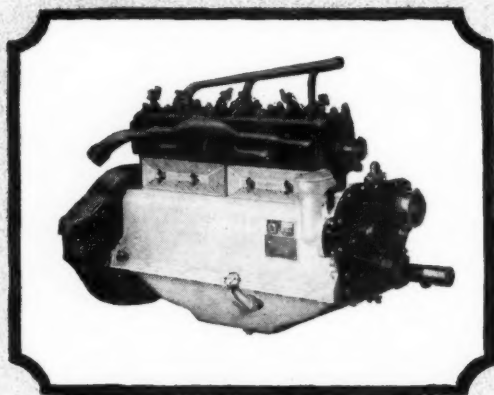


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AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XLII

NEW YORK—THURSDAY, FEBRUARY 5, 1920

No. 6

What the World Is Doing in Aviation

Nearly every foreign nation, especially England, France, Germany and Switzerland, is developing commercial aviation on a comprehensive scale. United States has thus far failed even to give proper encouragement to private airplane enterprise. France and Italy are gaining South American market

By Allen Sinsheimer

IN view of the present antipathy of Congress to aviation development, it is interesting to observe that the entire world outside of the United States is keenly alive to the possibilities and value of aeronautics. AUTOMOTIVE INDUSTRIES has obtained data showing what the different countries are doing to promote aviation and also possible markets for airplane manufacturers. This material indicates that this Government and the manufacturers in this country should take some definite action before the remainder of the world is equipped with airplanes purchased in foreign markets and before other nations become greatly superior to this one in quality and quantity of airplane and airship production.

Practically all of the countries asking financial assistance from the United States are included in those which are striving to gain aeronautical supremacy—in other words, the nations in distress realize the value of aeronautics, while this country, wealthier than all the others, apparently stands back and ignores its importance.

Argentina, which is a promising market for commercial aviation because of the great distance be-

tween its towns scattered over immense areas, has been given considerable attention by Italy, England and France, and scant consideration by the United States. Missions were sent by Great Britain, Italy and France, with planes and experienced fliers, to demonstrate to the Argentinians and to secure the available airplane business. The Curtiss Aeroplane & Motor Corp. of the United States sent a private representative to Argentina, the only display of American interest. The Italian mission brought twenty-two machines, together with numerous accessories and free services of instructors, with exhibitions not only in Argentina but in the neighboring republics. An Italian commercial aviation company has been organized which will operate Caproni airplanes starting with the route between Buenos Aires and Montevideo. The Italian Government made a gift of two S. V. A. biplanes to Argentina.

France sent twenty-five men, four officers and twenty-four planes to Argentina to engage in exhibits and commercial studies, and it is reported a postal and passenger line will be established between Argentina and Paraguay by the French mission under the name

of the Franco-Argentine Aerial Transportation Co., with a capital of \$1,000,000, of which \$700,000 has been subscribed. Germany, it is understood, is sending a mission to Argentina for the same purposes. England, through a mission, organized the River Platte Aviation Co., with a capital of \$200,000, operating three- and five-passenger De Haviland airplanes. Another mission from England is organizing an additional company, and numerous British manufacturers have their own representatives in the field. The Curtiss company of this country has four of the JN-4 airplanes and one flying boat in Argentina.

Other South American Prospects

Little interest has been displayed in Bolivia in aviation other than the establishment of a military air school, to which the Curtiss company is attempting to sell some of its products. Brazil, offering greater opportunities, has, like Argentina, been visited by missions from European countries. Aviation schools have been established by the Army and Navy Departments co-operatively with the French mission. Brazil will spend \$500,000 for the establishment of schools and the purchase of supplies. The transportation of passengers and express between the principal cities in Brazil has been authorized by legislation, and certain companies have been granted concessions which are not of a monopoly character.

A representative of the Curtiss company, with several airplanes and a flying boat, is located in Brazil.

An Italian airplane company has constructed a huge demonstration field equipped with numerous planes of different types, including Caproni planes, and Italy has tendered some of its war planes to the Government of Brazil. Certain Brazilian interests are attempting to secure the postal concessions.

British manufacturers are likewise making every effort to obtain business from Brazil, both through the Government and private concerns, and in addition plan to establish several mail and passenger routes. It is also understood that Great Britain has offered to make a gift of planes to the Brazilian Government. Orders have already been placed with the Handley-Page Co. for airplanes for Brazil.

Chile

In Chile again the European countries have firmly established themselves, Great Britain presenting the Government with a large number of airplanes and hydroplanes operated under the direction of the British mission. Numerous British manufacturers are bidding for business and for the establishment of factories and routes in Chile. Vickers, Ltd., would establish an aerial transport corporation in Chile if it can secure a concession from the Government, and plans to establish schools in addition. A mission from France has been in the country since November, 1919, and plans to establish a route between Valparaiso and Santiago, which will be operated by Farnum-Goliath, and plans to carry mail and passengers. This route may eventually be under the control of a corporation owned jointly by the Farnum Co. and Chileans.

There has been little progress made in Colombia, although the Curtiss company has had a representative there to obtain business from that Government. Ecuador, because of lack of financial resources, has not offered a promising field, although there is considerable interest in aviation, and it is possible that a manufacturer extending liberal credit can secure large business there. Several companies are operating airplanes in Cuba between that island and southern points in the

United States, most of the lines being equipped with European airplanes. Mexico, Paraguay, Panama, Venezuela and Uruguay have not as yet made marked progress in aviation, although Uruguay offers a field in an official way, the Government requiring planes for official use.

British and French companies and the Curtiss company of this country are active in Peru, where aviation is fast becoming popular. British manufacturers have representatives in the field and missions are establishing schools which will be well equipped with planes, fliers and mechanics. The Bolivian Government will spend \$275,000 to develop commercial aviation during the next two years. Air mail service is proposed.

China, Finland and Japan

The British Government has been particularly active in the development of aviation in China, where flying is controlled entirely by the Chinese Government and all fliers must operate under a license from the military authorities. Numerous British concerns and representatives of the Government are assisting the country to develop aviation schools. The Vickers Co., as was announced recently, has a contract from China for the purchase of 100 airplanes. The Curtiss company of the United States also has a representative there and plans to open sales offices in Shanghai and Peking.

An airplane college has been established in Finland, where regular air mail service between Stockholm and Helsingfors will be established, together with other routes extending between Finland and other countries. Likewise, a number of routes are to be opened in Holland during this year. It is planned to establish air lines between Flushing, Rotterdam and The Hague and other points, between Flushing and Germany and between Amsterdam and Maastricht. British manufacturers are all bidding for the contracts and also for contracts for airplane service between Holland and the Dutch East Indies. It is reported that they are likely to secure them. The Dutch Government is also planning to purchase airplanes. An aviation exposition was recently held in Amsterdam in which French, English, Italian and German manufacturers were prominent exhibitors.

The Japanese Government, recognizing the value of a powerful military air service, has made large appropriations for the purchase of planes, the construction of schools for the establishment of Government routes. It has sent missions to other countries to study their methods of constructing airships, and private Japanese concerns are making investigations of aeronautics in other countries with a view to establishing factories in Japan later. Air mail service between Tokio and Osaka is planned, together with an airplane police force. France has been actively engaged in developing aviation in Japan. Siam is operating an air mail service between the important points in that country.

Russia and Norway

Russia and Poland, due to the disturbances in these countries, are not at present keenly interested in the establishment of commercial aviation. Norway, hampered by climatic and physiographic conditions, has not made large aviation development. There are, however, several commercial projects planned, and regulations for flying are now before the legislature. Airplane corporations have been organized in Norway to operate routes between Christiania and other points. An airplane factory and airplane dealers are operating in Norway. The British Government and British manufacturers are both actively engaged in promoting aviation

in Denmark, Norway and Sweden. A Danish company is being organized to establish routes between Denmark and Germany and Denmark and London. A Norwegian route is planned between Norway and Scotland.

With intelligent comprehension of the importance of aviation and the value of large export and domestic aeronautic trade, France is developing a governmental department of aviation and in addition is making every effort to assist private enterprise. Thirty-seven million francs have been appropriated for civil aviation, of which 18,000,000 francs will be devoted to subsidies, which will be paid to French manufacturers, operators and pilots of airplanes. Subsidies will be paid according to distance flown, according to the amount of tonnage carried and according to the military value of commercial planes, which may be used in event of emergencies.

Numerous French transport companies have been organized to operate both airplanes and airships. Routes are contemplated between Paris, Marseilles and Africa, and others have already been established for the carrying of civil mails. There will be weekly civil mail carriage between Athens and Salonika, Constantinople and Salonika, Constantinople and Bucharest, and Bucharest, Galatz and Kichenef. Government mail routes operated under agreement with Great Britain are already established between Paris and London, and other French mail routes are operating between Paris, Lille and Brussels, and between Toulouse and Rabat.

A comprehensive plan has been worked out for exploiting French aeronautics in Spain, the Near East and Czecho-Slovakia. In addition to the missions already sent to Argentina and Japan, others will be sent to Brazil, China, Siberia, Turkey, Greece and numerous other countries.

Great Britain

Great Britain, which operates a Royal Air Force supposedly separate from the military establishment but headed by the Minister of War, is inaugurating a civil aviation department within the Royal Air Force and co-operating with it. However, the chief commercial activities thus far have been through the military establishment. The department of civil aviation is working chiefly on the formation of regulations and the conclusion of agreements with other countries. It anticipates that before long it will take over various routes which have been established by the military forces, including such as the Cairo-Karachi route. Pilots, airdromes, navigators and airplanes are all required to take out licenses, and in the first five months of the enforcement of this act, 700 licenses were issued for pilots, engineers and navigators, 100 for the construction of airdromes and 500 for air worthiness and general registration.

The extent to which civil aviation is being carried on in Great Britain during five months of last year is indicated by the fact that in this time commercial airplanes carried more than 50,000 passengers over 300,000 miles, making more than 20,000 flights. Practically all of the emergency landing fields in the United Kingdom have been selected, inspected and made available. Wireless stations have been erected throughout the country and all activities that will improve and foster aeronautics are being given consideration. Many private companies have been formed which will develop routes in India, Canada, Australia and Africa. The mail service between London and Paris carried in conjunction with an agreement with France, has been very successful and is being rapidly expanded.

The use of airplanes for carrying mail, freight and

passengers in Germany has perhaps been developed to a higher degree than in any other country, and routes have been established between Berlin and all important cities, and the numerous airplane manufacturers, although lacking necessary materials, are reported to be constantly active, both in manufacture and general merchandising. Numerous flying organizations have been formed throughout the country, all of which are contributing to further development of the industry and operation of planes. The Government is negotiating abroad to sell planes, is establishing missions in different cities, and is attempting to enter into agreement with foreign countries for the carriage of air mail.

Italy

Italy, where aviation is under three Government branches, military, naval and civil, with the latter controlling air routes and foreign missions, technical service, etc., has been very successful in attracting foreign trade through its missions, which have been sent to Scandinavia, Brazil, Argentina and Spain. Others are contemplated for the many other countries. Missions are establishing schools in this country where they train the citizens in flying, using Italian airplanes and attracting business in this way. The Government is planning to establish several routes from Italy to other countries and private Italian companies have been formed for similar purposes.

The air mail service is in operation between Italy and Greece and air mail routes have been established between Rome and Naples and between Rome and Sardinia. The Italian Government will subsidize any reputable company that operates airplanes for commercial purposes. There have been many private and Government-owned airdromes established throughout the country.

Portugal Uses French Planes

That the Portuguese Government will not operate planes directly is indicated by the fact that it is establishing routes through its principal cities and extending them to other countries. They will be used chiefly for the carriage of mail by private corporations for which airplanes have already been purchased. Portuguese operators buy planes from France and use French instructors. A private Portuguese concern has been established with a capital of \$300,000 which will operate air mail service between Lisbon and Oporto if Government concessions can be secured, and which will later, with Government approval, establish routes between Lisbon and Madrid, taking in the various cities en route.

Spain

Spain has thus far shown but little interest in aviation, although it is anticipated that the activities of Great Britain, Italy and France in that country will soon arouse a demand for airplanes and airships. The Handley-Page Co. has established an agent, who has several planes which will be operated to carry passengers and express between Barcelona and Valencia. This concern has purchased two fields and intends ultimately to operate thirty planes of British manufacture. A hydroplane mail and passenger service is to be established between several important cities of the country by private enterprise, which has ordered six hydroplanes for this purpose. The Spanish Government has indicated its willingness to co-operate with private enterprise by first establishing mail routes and then turn them over to private concerns capable of continuing the service under contracts.

Complete rules and regulations for air traffic have been established by Sweden which prohibit foreigners from flying over the country without license, and which require, in fact, that all fliers and airplanes must be properly licensed and operated under definite rules. Sweden is exceedingly anxious to develop aviation. Several private companies have been formed to establish domestic and foreign routes, and the Swedish Government has been negotiating with Great Britain for further development of aeronautics.

Switzerland

Probably no country has given more attention to aviation than Switzerland, where commercial aeronautics have been developed to a high degree. Numerous private companies have been organized and are in operation. Passenger service has been established over regular routes between Zurich and Geneva, including cities en route, and the same company intends to operate shortly between Berne, Lucerne, Lugano, Geneva, Interlaken and other cities, as is indicated by the fact that airdromes have already been built or are under construction in these towns.

The Government operated an air mail service, but due to the fact that it was operated at a loss, the service was transferred to a private company, which was subsidized and is operating most successfully. Many schools have been established throughout the country, both private and governmental, for the training of pilots. The Swiss Government has issued regulations for the control of flying and for the licensing of fliers.

United States

Several companies have been organized in the United States for the development of commercial aviation and for the operation of planes. These are all private concerns which are, as a rule, small, operated by ex-Army fliers and without the necessary funds or other assistance, which would enable them to carry on regular flying schedules or extend their businesses. The Curtiss Aeroplane & Motor Corp. has opened several agencies in for-

eign countries, but are unable to make much headway because they must compete with the missions from other countries that are supported by their Governments.

The private companies which are operating airplanes in this country find it a difficult proposition because, firstly, they enter into business that is new and novel and consequently hazardous, and consequently they are obliged to take great risk, not only because of the novelty of the business and its lack of precedence, but also because the possibility of making profits are rendered unlikely by the various taxes levied on business in general by the Government. There is no Government assistance extended to aviation in the United States. The Air Mail Service at one time announced its willingness to turn over established routes to reputable private concerns which would operate the air mail service under contract, but the Congress of the United States recently indicated that it would end the Air Mail Service soon.

No rules or regulations have been formulated for the control of flying in the United States. Various individual States are passing their own legislation, making it very difficult because of the conflicting laws fliers encounter in passing from one State to another. The national legislature has spoken several times of the possibility of regulating aviation, and has also given consideration to bills on this subject, but up to this time there has been no definite result.

The Department of Interior has developed aviation to some extent by maintaining a forest fire patrol in the West, where 20,000,000 acres of national forests are patrolled daily by several airplanes, which have proved exceedingly efficient.

The most successful Government attempt to develop aviation has been the Air Mail Service of the Post Office Department, which has operated successfully for two years, flying 500,000 miles, carrying 25,000,000 letters and achieving a record of 91.50 per cent for efficiency. The air mail has been carried at 2 cents per ounce at a profit. It is, perhaps, the most important single Government agency for the development of commercial aviation in the United States.

Automobile Industry Grows Rapidly Is Indication of Payroll Figures

THE rapid growth of the automobile industry is strikingly illustrated by the figures which show the total October payroll of 48 representative automobile manufacturers for 1918 and 1919. The 1919 figures present an increase of 48.3 per cent over the total for the same month in the previous year.

An increase of 29.3 per cent is shown in the numbers on the payroll of these companies when the same months are compared. This gain in per cent represents an actual gain of 36,173 employees.

The fact that the total wages paid increased 48 per cent and the number of the payroll only 29 per cent would indicate that there has been a general raise in the level of wages in the industry. This is undoubtedly true, and is borne out by other figures compiled to show the trend of wages. It is also interesting to note that the increase in the payroll of the automobile concerns is greater in per cent than is that of any other industry. This indicates the more rapid growth of the automobile industry rather than an exceptionally high compensation per man.

Industry	Establishments reporting for October both years	Period of payroll	Number on payroll in October		Amount of payroll in October		Per cent of increase (+) or decrease (-)
			1918	1919	1918	1919	
Automobile manufacturing	48	1 week	123,358	159,531	\$3,497,842	\$5,188,607	+ 48.3
Boots and shoes	73	1 week	56,501	65,518	1,080,254	1,469,956	+ 36.1
Car building and repairing	55	½ month	76,229	54,160	5,073,819	3,167,060	- 37.6
Cigar manufacturing	55	1 week	18,305	16,120	267,067	312,905	+ 17.2
Men's ready-made clothing	38	1 week	19,461	19,601	363,267	529,489	+ 45.8
Cotton finishing	17	1 week	13,253	14,794	251,154	321,872	+ 28.2
Cotton manufacturing	59	1 week	48,359	57,804	744,658	995,873	+ 33.7
Hosiery and underwear	64	1 week	30,765	33,359	453,871	569,868	+ 25.6
Iron and steel	108	½ month	191,084	109,027	13,694,014	7,233,838	- 47.2
Leather manufacturing	35	1 week	16,460	18,111	348,202	447,544	+ 28.5
Paper making	57	1 week	29,247	30,353	644,522	747,763	+ 16.0
Silk	48	2 weeks	14,450	15,386	487,286	604,991	+ 24.2
Woolen	49	1 week	44,252	49,486	805,647	1,004,822	+ 24.7

Lightness, Simplicity and Accessibility Feature LaFayette Engines

D. McCall White has accomplished his ends in the design of this motor by eliminating numerous parts that have previously been considered essential; especially is this true of the valve mechanism, where the camshaft permits of direct operated valves. Also steel alloy tubing is used in several places to replace solid shafts, in the interests of strength and weight.

By J. Edward Schipper

THE LaFayette car, designed by D. McCall White, incorporates an eight-cylinder, V-shaped engine, which is notable for its simplicity and lightness, due to the elimination of a great many parts heretofore considered essential in eight-cylinder practice. These parts have been eliminated, particularly from the valve mechanism by a camshaft design which permits of direct-operated valves. A complete line of bodies will be mounted on the 132 in. chassis, which is of original design throughout.

A maximum speed of 4000 r.p.m. is attained by the 90 hp. $3\frac{1}{4}$ by $5\frac{1}{4}$ in. engine, which has a displacement of 348 cu. in. The use of quality materials is notable throughout the engine, as well as the chassis and body. Forgings are used in place of malleables, and alloy steel tubing of large diameter in place of small solid shafts to give lightness with strength. Considerable use is also made of the newly developed aluminum alloys.

Unit power plant construction with four-point suspension is utilized, the four crankcase arms being bolted to the frame. One of the chief reasons for the use of four-point suspension is to facilitate access to the front end of the engine, as the front cover plate has no function in supporting the engine and thus may be readily removed. The cylinders are cast in two blocks of four with

detachable heads and internally-machined combustion chambers.

The exhaust manifolds are cast integral with the cylinder blocks and the exhaust gases are thereby led away from the lower side of each block by means of a single connection. This does away with the multiple connections usual in eight-cylinder engines and cuts out the bolts and hot pipe which often are in the way when making a valve adjustment.

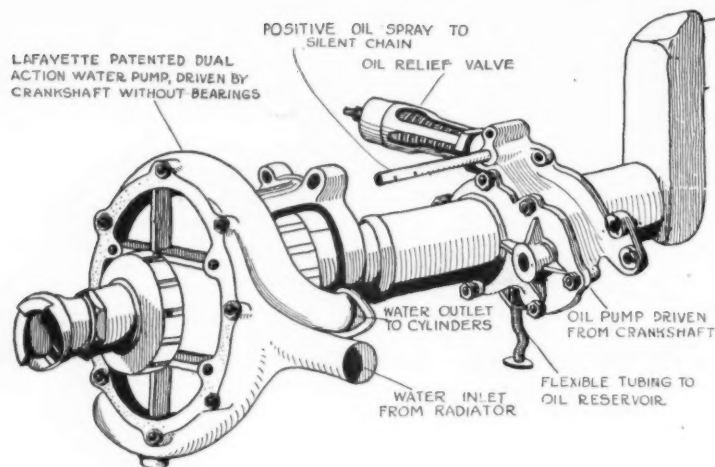
The crankcase is in two parts, cast separately for accessibility. For example, it is not necessary to remove the engine from the frame to reach the main bearing. It is in the valve action, however, that the greatest gain has been made in the elimination of parts and in accessibility. The camshaft is a single Liberty engine type, hollow throughout its entire length, with 16 cams. The valve action is direct, the cams operating on the valve tappets without the medium of rocker arms, and to secure accessibility with the V the valves are set at an angle of 9 deg. with the cylinders, producing an angle of 108 deg. in the valve alley. This gives more hand room and makes the valve adjustment easy. It also brings the valves closer to the combustion chamber and produces a better arrangement for gas flow. The valves are forged from tungsten steel, with the heads and stems integral, and the opening is of large diameter, the valves being of Liberty engine type with grooved ends on the stems to give a good grip on the collar.

The crankshaft is carried on five main bearings and is also of the Liberty engine type, being a hollow forging of chrome nickel steel. It has $2\frac{1}{4}$ in. diameter and is mounted on bearing metal of the same analysis as that used in aircraft engines. The bronze backings are made rigid by ribbing and the babbitt lining is scraped and polished by hand, this being an unusual method of manufacture to-day, when most makers have gone to line-reaming or broaching.

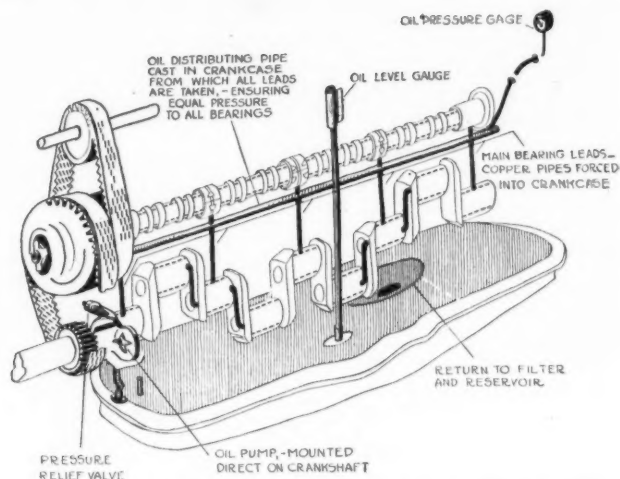
The pistons are of iron and the connecting rods of alloy steel, with an angle of oscillation of the straight rod on the bushing of only 33 deg. 44 min. The wrist pins are tubular, case hardened and ground, and are secured in the



A feature of the LaFayette is the high radiator with vertical shutters



The dual-action water pump and oil pump are both driven by the crankshaft



Pressure circulation system oil pump direct driven on crankshaft

piston. A dual water pump, without gears and bearings, feeds each block of cylinders independently. It is supported upon the front cover plate of the engine and the impeller is fastened to an extension of the crankshaft and is driven by it. In fact, the crankshaft is also the pump shaft, and no bearing is required, the body of the pump having no function in supporting the shaft. This design necessitates only two packing glands, free from bearings, and the water pump requires no lubrication. In connection with the cooling system there are thermostatically controlled shutters regulating the air circulation. These shutters are operated by vacuum and controlled by thermostatic metal at the rear end of the cylinder block. When the engine is cold the shutters are closed. As it becomes warmer they are thermostatically opened. It is plain that with this system there is no danger of the water freezing when the engine is running, as all of the water is then in circulation.

The radiator is of cellular type and is supported by a patented method, the tank of the radiator fitting into a U-shaped bracket on each side bar of the frame. The fan is driven by silent adjustable chains, with a compensating spring drive which absorbs the shock due to changes in engine speeds.

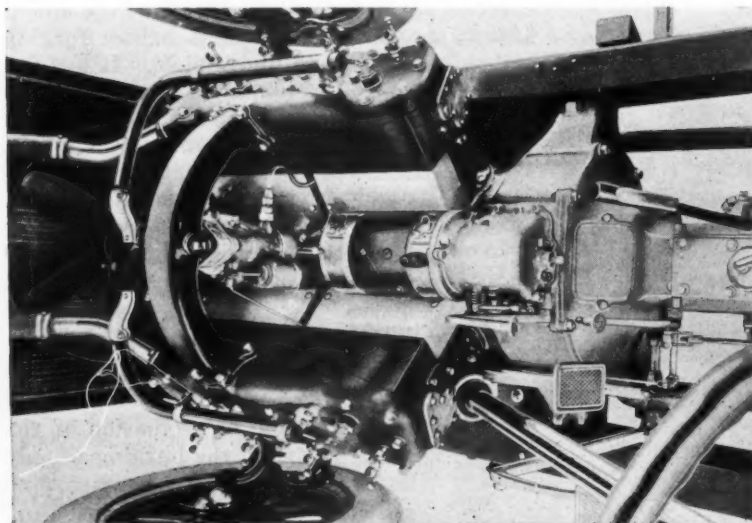
Lubrication is by the pressure-circulating system operated by a patented oil pump direct driven on the crankshaft. The driving gear of the oil pump is keyed to the crankshaft, the housing carrying an idler gear. This

eliminates the necessity of an additional shaft with its bearings and driving mechanism. A very close fit between the oil pump gears and the sides of the case is used to insure delivery of the oil at low speeds. One of the features of the oiling system is the effort to increase the life of the oil by only circulating what is used. The pressure relief valve is integral with the oil pump assembly and any overflow from the valve returns directly to the oil pan and does not circulate through the system.

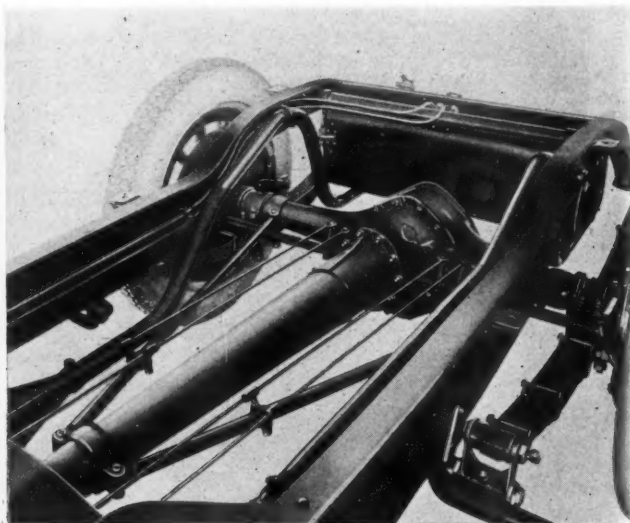
The camshaft, as well as the crankshaft, bearings are under oil pressure, and the front end chains are in line with the main supply of oil, being taken care of by the header which carries the oil to the camshaft bearing. The pistons, cylinders and valves are lubricated by the oil mist from the crankcase. The system has no extension oil pipes, except the one transmitting pressure from the crankcase to the dash. There is a flexible connection from the oil pump to the suction pipe in the oil pan. The oil level gage with float indicator at the left side of the engine is high enough to be readily visible and it is illuminated by an engine lamp at night.

Delco ignition, lighting and starting is employed. Starting and lighting are taken care of by a 6-volt motor-generator operating in connection with an Exide battery.

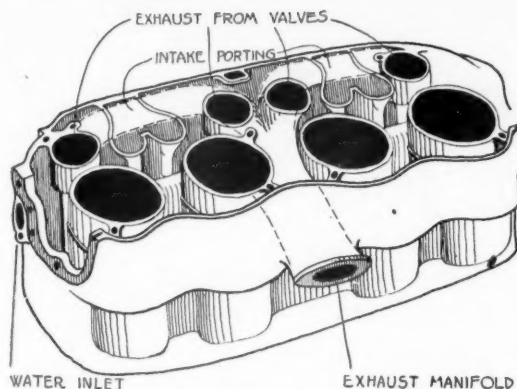
The carburetor is of special design, made to suit this particular engine. It is mounted on the intake manifold part which forms an arched bridge between the cylinder blocks. The fuel passage is exhaust-jacketed, with the



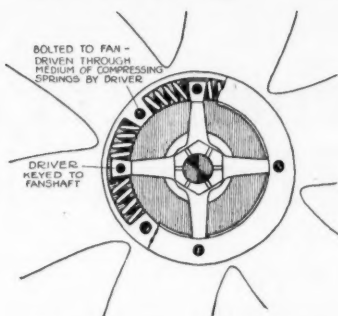
View of engine showing valve accessibility



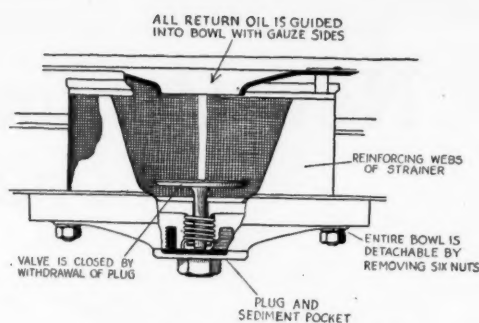
Rear construction of the chassis



Water jackets, intake manifolds and exhaust manifolds are integral with the cylinder blocks



The compensating spring drive of the fan



Copper gauze bowl in center of reservoir

exhaust alternately coming from the two cylinder blocks, thus giving a surging effect around the jacketed chamber. Fuel is fed from the 20 gal. tank at the rear of the chassis, the tank being of a contour to suit the chassis frame. It is accessible by means of a patented filler cap which has a breach mechanism necessitating only a half turn of a thumbscrew to insure an air-tight fit. Oil is fed by pressure from an air pump located in the center of the V and actuated by an eccentric on the camshaft.

A multiple disk clutch of the dry-plate type, with 17 steel plates, alternately faced with asbestos, transmits the drive through a selective sliding three-speed gearset with chrome nickel steel shafts and gears through the propeller shaft to a floating rear axle. The tubular propeller shaft is housed within a torque tube providing practically straight line drive from the engine to the rear axle. The engine is sloped very slightly in the frame to produce this straight line effect. Only one universal joint is used with this drive, this being a LaFayette type with hardened steel bearings all enclosed in the oil-tight torque ball casing. It is located in the rear end of the transmission and has a very small movement. It is lubricated by the transmission lubricant. The pressed steel torque tube which houses the propeller shaft takes both the torque reaction and the drive. It is stayed by two tie-rods from the rear axle, giving a triangular rigid layout.

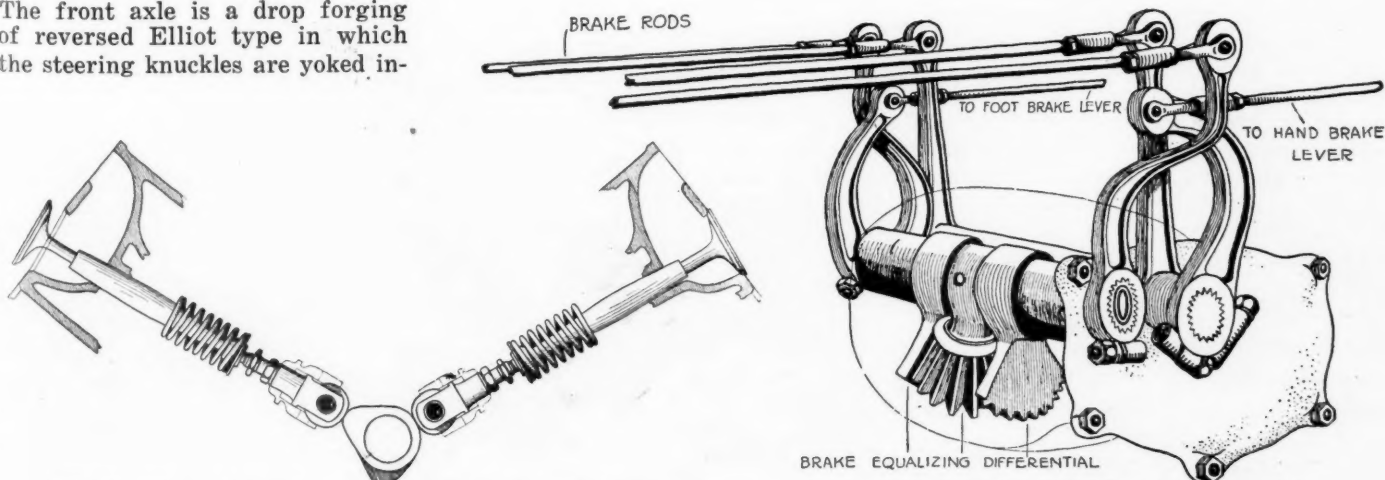
The rear axle is particularly light, due to the use of an aluminum differential carrier. The drive is transmitted through spiral bevel gears, and the load is carried on large capacity Timken bearings. Bearings are located on each side of the pinion to give a shorter shaft and shorter design of differential carrier than usual. Both the pinion and ring bearings are adjustable. The front axle is a drop forging of reversed Elliot type in which the steering knuckles are yoked in-

stead of the axle. The spring seats are integral with the I-beam.

Two sets of brakes are provided, both on the rear wheels. The drums are 17 by 2½ in., and equalizing is secured through a pinion and sector on the differential principle. The steering gear is a worm and sector, adjustable, with ball-thrust bearings housed in an aluminum casing.

The frame is of channel section, 6½ in. deep, upswept in the rear and uniformly stressed throughout. It is stiffened by three tubular cross-members and one U-section cross-member reinforced with gussets. The frame is 30 in. wide in front and 35½ in. at the rear. The wheels are wood artillery, mounted on drop forged and pressed steel hubs and run on Timken roller bearings. Firestone rims are used for the straight side tires, the size depending on the body. Five tires are supplied as standard equipment, ribbed tread in front and anti-skid rear and spare. The car is hung on semi-elliptic springs and the chassis lubrication is by the Alemite system, by means of which grease is forced into the bearings under 500-lb. pressure. The control is of the central type, the service brake, clutch and accelerator being operated by pedal, and the throttle and spark control by hand levers on the steering wheel in the customary manner.

Upholstery is leather, with French plaits over Marshall springs. Marshall springs are also incorporated in the auxiliary chairs, and there is padding under the rear carpet. The car is fully equipped in every respect, the windshield having the lower glass stationary and the upper glass swinging outward. Other items of equipment include a windshield cleaner, full lamp layout, rear sight mirror, engine service lamp, cigar lighter, tilting reflectors, gasoline gage, Kellogg air pump for tire inflation, Klaxon horn, foot rest, robe strap, license holders and a complete set of tools. The price has not yet been fixed.



Valve action is direct, cams operating the valve tappets without the medium of rocker arms

Pinion and sector equalizer, assembled with transmission

New Continental Engine an Exceptional Production Job

The 7R model shows several departures from Continental practice but is in no wise radical. Consideration given to life and performance and to accessibility of important parts. Engine and producing machinery designed as manufacturing unit.

MANUFACTURING operations are under way on a new Continental engine model, the 7R, for which more extensive tooling-up preparations were made than for any previous Continental model.

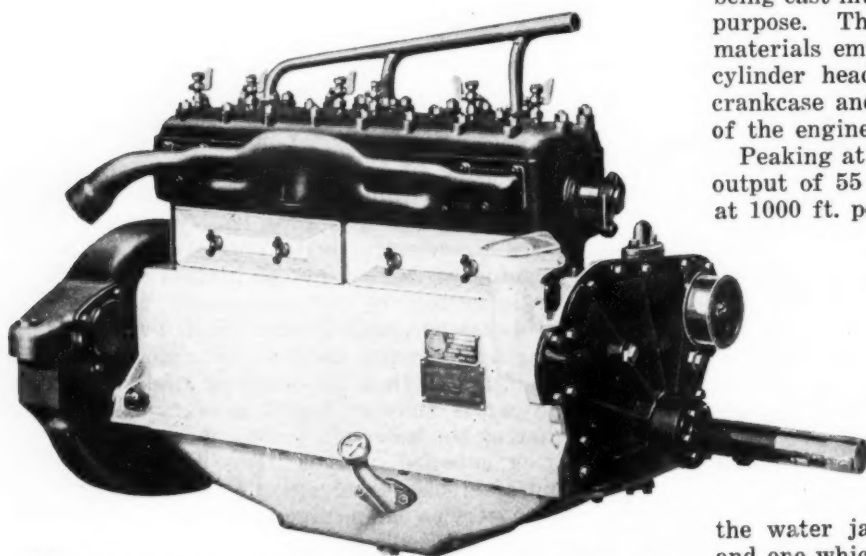
The new engine is a $3\frac{1}{4} \times 4\frac{1}{2}$ in. six, unit power plant type, with removable cylinder head and aluminum crankcase. It incorporates many features new to Continental practice, although not of a radical nature. The vaporizing intake manifold, full pressure feed oiling system with gear type oil pump, and a number of detail refinements

valves with long bearings for the valve stem guide and push rod guide, an improved water pump, a very accessible oil filler and an accessible layout of the valve spring chamber so that the cover plates are readily removable and the tappets easily reached for adjustment.

The engine is designed for main frame mounting with a three-point suspension. The rear supporting arms are integral with the flywheel housing and the width between supporting bolt centers is $24\frac{1}{2}$ in. The front end of the engine rests upon a cross-member of the chassis, a trunion being cast integral with the timing gear case cover for the purpose. There is nothing out of the ordinary in the materials employed. Cast iron is used for the cylinders, cylinder head and flywheel housing; aluminum for the crankcase and pressed steel for the oil pan. The weight of the engine is 660 lbs.

Peaking at 2600 r.p.m., the engine produces a maximum output of 55 hp. At 1000 r.m.p. it produces 26 hp., and at 1000 ft. per min. piston speed, 34 hp. The piston displacement is 286.8 cu. in., or 37.33 cu. in. per cylinder. The combustion chamber measures 10.8 cu. in., the clearance ratio thus being 22.5 per cent.

The cylinder and valve layout is along conventional L-head lines, with the valves on the right side of the engine. The exhaust manifold is cast integral with the intake, giving the hot-spot type of construction. The cylinder casting is very simple, containing only the barrels and the water jacket. This gives a casting easy to handle and one which is readily machined.



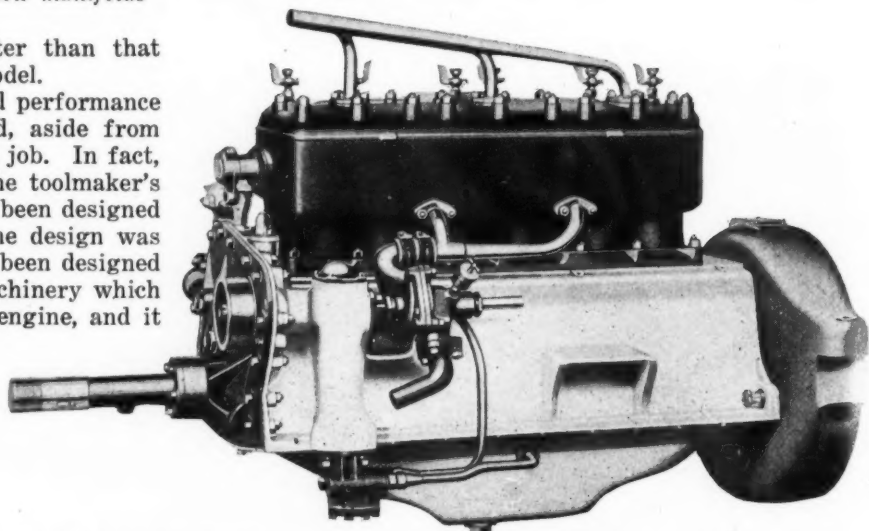
Valve side of 7R Continental engine. Note new manifolds

are claimed to insure a performance better than that obtained from any previous Continental model.

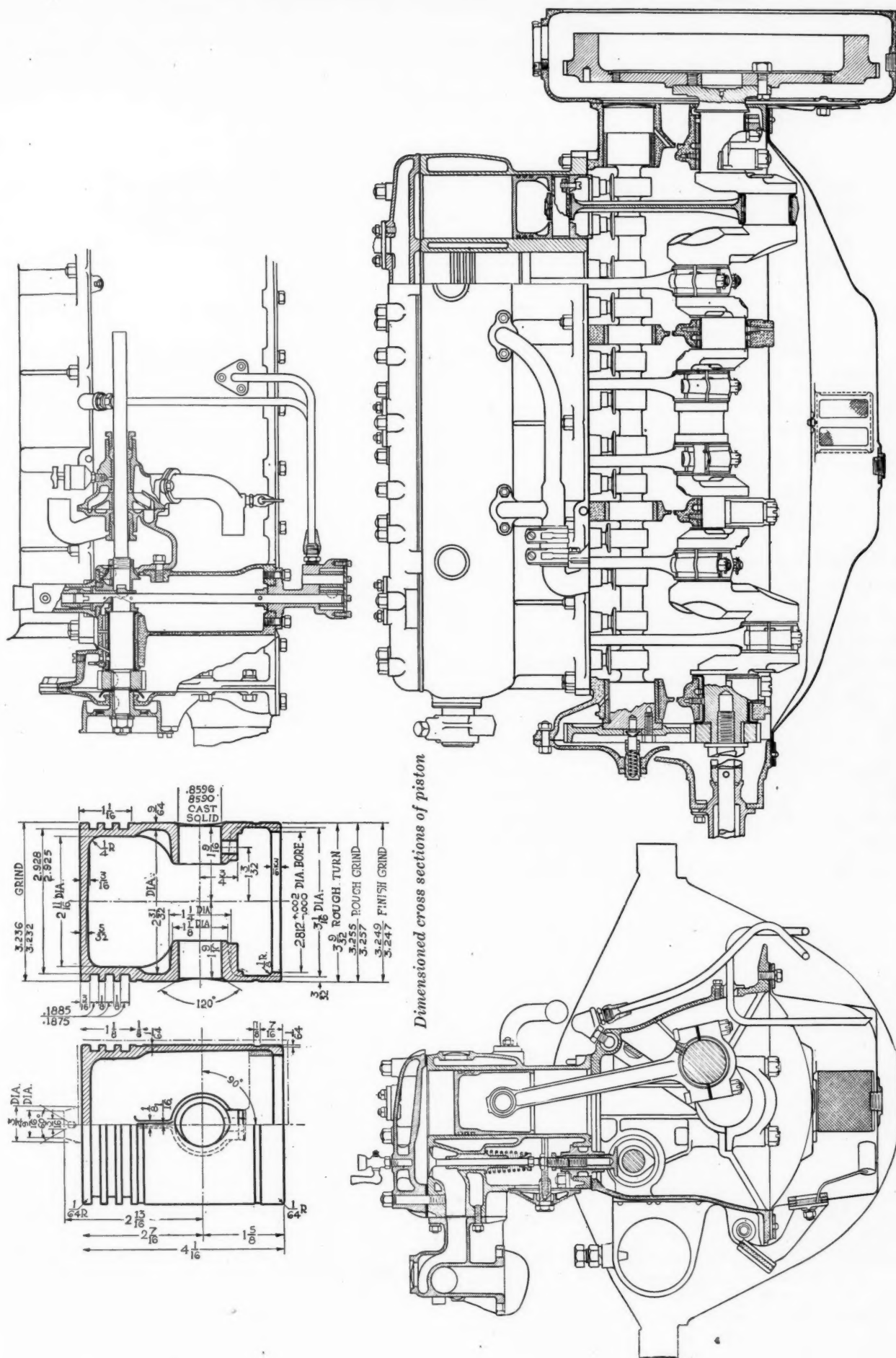
A study of the design shows that life and performance have been given careful consideration, and, aside from this, the engine is an exceptional production job. In fact, the design has many of the earmarks of the toolmaker's art, the jigs and fixtures for the job having been designed with the engine, instead of after the engine design was completed. In other words, this engine has been designed for the machinery, just as much as the machinery which is to produce it has been designed for the engine, and it enters the Continental plant as a complete manufacturing unit.

New Crankshaft Balance

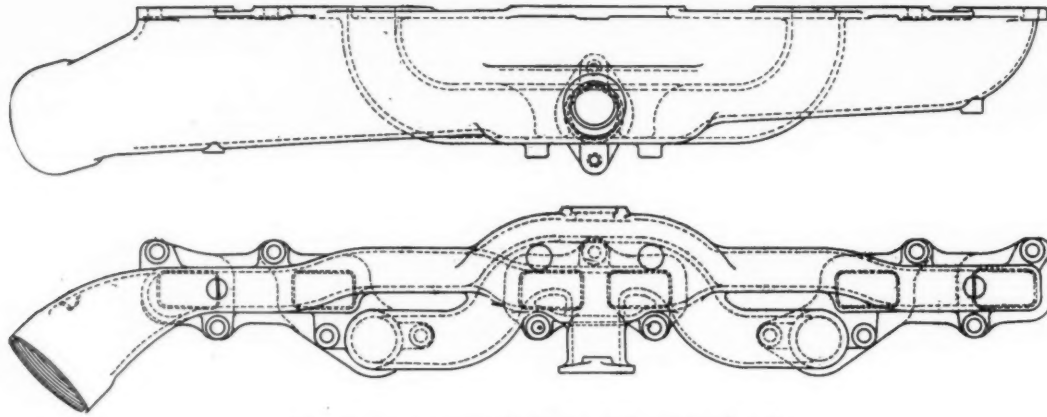
Features that affect the life and performance include a four-bearing crankshaft, a four-bearing camshaft, an entirely new system of crankshaft balancing, long connecting rods, long pistons, a balanced timing gear train, large



Left side 7R Continental engine. Note lugs on head for easy removal, and two-point water intake



Dimensioned cross sections of piston



Two views of combination inlet and exhaust manifold

The pistons are cast iron, $4\frac{1}{16}$ in. in length, with three eccentric rings $\frac{3}{16}$ in. wide, all mounted near the top. The connecting rods are $10\frac{1}{2}$ in. long, machined all over, and provide a piston pin bearing of $\frac{7}{8}$ in. diameter, the pin length being $1\frac{3}{8}$ in. The big end bearing is $2\frac{1}{4}$ in. in diameter and $1\frac{9}{16}$ in. long. The crankshaft is exceptionally heavy, being $2\frac{1}{4}$ in. in diameter at all bearings, the lengths of which are as follows (front to rear): $2\frac{5}{16}$, $1\frac{9}{16}$, $1\frac{9}{16}$ and $3\frac{1}{16}$.

Camshaft Practice

Four bearings also support the camshaft, which is driven by a helical gear train. The camshaft diameter is $2\frac{1}{4}$ in., and the dimension of its bearings (front to rear) are: $2\frac{5}{16} \times 2\frac{1}{16}$, $2\frac{9}{32} \times 1$, $2\frac{1}{4} \times 1$ and $2\frac{7}{32} \times 1\frac{5}{8}$. The cams act directly upon hollow mushroom tappets into which is screwed the adjusting stud, which acts against the bottom of the valve stem. The valves, which are interchangeable have a $1\frac{5}{8}$ in. head diameter and $1\frac{1}{2}$ in. diameter of clear opening. The valves are 45 deg. poppet type with a lift of $\frac{5}{16}$ in.

The oil from the pump is fed under pressure through the drilled crankshaft to the main bearings, connecting rod lower end bearing and timing gear case. There are no splash troughs beneath the rods, but spray from the ends of the rods takes care of the cylinder walls and pistons. All the oil drains back through a cylindrical screen to the reservoir in the bottom of the pan, this being separated from the crankcase proper by an inner pan, allowing oil to reach the reservoir only through the strainer. The deepest part of the crankcase, instead of being at the rear end, as is generally the case, is nearer the center of length of the engine. One of the features of the oiling system is the external mounting of the oil pump, rendering it particularly accessible, as may be seen in the illustrations of the engine exterior.

Cooling System

Probably the most noticeable feature of the cooling system is the triple outlet brass water pipe. Another feature is the more efficient water pump, rotating at $1\frac{1}{2}$ times crankshaft speed. The 16 in. fan is driven through a $1\frac{1}{4}$ in. flat belt running over a 4 in. diameter pulley. The fan-driving pulley is secured to the end of the water pump shaft. The fan is mounted on an adjustable bracket located on a boss at the front end of the cylinder casting.

The auxiliary drives are arranged as follows: The distributor is mounted on the crankcase and is driven by spiral gear from a vertical shaft rotating at one-half crankshaft speed. The direction of rotation, looking down on the distributor, is clockwise.

The lighting generator is attached to the left side of

the engine, looking at the flywheel end, and if a magneto is wanted, special provisions must be made for it. The generator is driven by the water pump shaft and rotates clockwise, the new S. A. E. mounting being used on a bracket cast integral with the crankcase. The starting motor is mounted on the right side of the engine and secured to the crankcase by means of the standard S. A. E. flange arrangement $3\frac{1}{2}$ in. in diameter. Provision is also made for fitting a $1\frac{1}{4}$ in. standard S. A. E. vertical type carburetor. A ratchet for starting is furnished, but no starting crank. A cable holder will be provided as special equipment at extra charge.

This engine is suited to take any standard type of multiple disk, plate or cone clutch. The flywheel is semi-steel, of 15 in. outside diameter, and weighs 55 lbs.

From the viewpoint of accessibility this engine has been very well thought out. For instance, the camshaft can be drawn out from the front end. Valve adjustment or the removal of valve springs is a very simple operation, for the reason that after the side cover plates are removed the parts can be reached through a large, clear opening. The detachable head, of course, provides an accessible means of cleaning out carbon or reaching the valves.

The exterior oil pump, together with the internal leads, provides an exceptionally accessible assembly for this unit, and the oil filler opening has been placed in such a position that it will not be covered by any parts of the chassis when mounted in a car.

German Automobile Industry

ACCORDING to *Der Motorwagen*, the state of the German automobile industry can be described as favorable; especially in the truck industry large orders are on hand, which will insure plenty of work for a long time. As the entire production continues under the control of the Government, sales to private parties can be made only under special permits. Passenger cars, on the other hand, are being sold without restrictions. As the demand for passenger cars from the general public is very brisk, the outlook for this branch of the industry also is satisfactory. The completion of orders on hand is likely to take considerable time, on account of the reduced productivity of the works, and, therefore, no change in conditions is to be expected for some time. On the other hand, severe competition is expected as soon as American products are admitted again. Although government control of the rubber industry has been abolished, the supply of tires, especially for passenger cars, is very limited, and this is greatly hampering transport.

Analysis of German Trucks by the Motor Transport Corps

This article continues the report of the trucks surrendered to the A. E. F. under the terms of the armistice. The results of the investigations and tests are being made public as rapidly as they are completed for each truck.

By C. R. Hays*

Hercules

Motor

Four cylinder, L head, 4 point suspension, 4½-in. x 6-in. bore and stroke. Suspension upper half of crankcase.

Cylinders

Cast in pairs, L head, valves located on right-hand side. Flat combustion chambers with counterbore at base of cylinders. Cylinders are cast so that by adding a plate the valves are protected. Cylinders are held down with six 7/16-in. studs. Valve guides are cast iron 4¾-in. long and pressed into the cylinders. Water enters on the opposite side from the valve, is baffled, flows around the cylinders and rises around the valve seats and guides. The water area is exceptionally large, there being no water space between the two cylinder walls. The cylinder walls are 5/16 in. thick. On the opposite side of the valves are bosses cast, which can be tapped out and used for additional plugs. The priming cups are directly over the combustion chambers. By taking out these cups, spark plugs can be screwed in, although the regular spark plugs are over the valves.

Flywheel

Flywheel is of cast iron. Dia. 18½ in.; 3½ in. wide. Counterbore 2¾ in. for cone clutch, having a rim 1¼ in. in thickness. Flywheel is semi-finished all over.

Crankcase

The upper half of the crankcase is of cast iron. This case is of good construction and well ribbed, the walls being ¾ in. thick. The lower half of the crankcase is of cast iron, a false pressed steel base and a three gallon oil sump, which is cast integral with the case. The crankcases have lap joints and no gaskets. There are two large inspection holes on the upper half of the crankcase. The inspection holes are covered by a cast plate with a cast integral elbow 3 in. inside dia. These covers are used for three purposes—to cover inspection hole, oil fillers, and breather, there being inserted into these elbows fine meshed wire gauze.

Crankshaft and Bearings

Crankshaft forging with flywheel hub forged integral, machined all over, the short cheeks being drilled to by-pass oil from the bearings to a connecting rod. Short cheeks are 1 in. thick by 2⅝ in. wide. Long cheeks are 1½ in. thick by 2⅝ in. wide. Front and center crankshaft bear-

ings are 1 13/16 in. x 2⅝ in.; the rear bearing is 1 13/16 in. x 3½ in. These bearings are babbitt lined, bronze backed, and held to the upper half of the crankcase by heavy cast iron caps and two ½-in. studs.

Connecting Rods and Bearings

Connecting rods are I-beam semi-finish drop forgings with the bearing end and the cap exceptionally heavy. Connecting rod bearings are babbitt lined, bronze backed and held in by dowels. The caps are held on by four 5/16-in. bolts. There are circular oil grooves in lower half and two V-shaped, forming a diamond in the upper half, which collects oil from two ¼-in. oil holes in the connecting rod. The piston pin bearings are bronze bushings, pressed into the connecting rod. No shims are used between the cap and rod.

Pistons and Pins

Pistons are cast iron, flat top with the corners rounded off, with four 3/16-in. lap joint hammered concentric compression rings. The piston head is ½ in. thick. No oil grooves in skirt and a very small rib at the bottom of skirt. Piston is 4 15/16 in. long, pin located 2⅝ in. top of piston and held in by set screws. Piston pin is ⅞ in. in dia., hollow, hardened and ground.

Timing Gears

Timing gears are spur gear type. Timing gear on the crankshaft is 4¼ in. outside dia., 42 teeth, 7/32 in. deep, 3/16 in. at base and 1¼-in. face, camshaft gear meshing directly into the crankshaft gear. These gears are steel and soft. Crankshaft gears are held on by straight key. The camshaft gear is bolted on a steel hub. On the rear end of this is located a spiral gear for driving a cross shaft. This shaft drives the water pump and magneto.

Camshaft and Bearings

Camshaft is steel forging with cams forged integral, shaft being hardened and ground all over. Shaft is 1/16 in. in dia. The true cam radius is 1 3/16 in. with ⅜-in. face and ⅜-in. lift. Camshaft has three bronze sleeve bearings with the center bearing split in halves. On camshaft next to rear bearing is a spiral gear integral with the shaft for driving oil pump shaft.

Valves

Mushroom type, 1⅞ in. dia. of head, 8 5/16 in. long, 11/32 in. stem with 45 deg. seat, 3/32 in. wide, thickness

*Mr. Hays is chief of the experimental section, Motor Transport Corps.

of the head 3/16 in. Valve springs are held in place by a small machined cap and 1/8 in. x 3/8 in. straight pin running through a broached hole in the valve stem. Valve caps are cast iron. Valves and caps are interchangeable. Valves are protected by covers on side of cylinders.

Valve Tappets and Guides

Valve tappets are the roller type with a 25/32-in. dia. tappet body of steel hardened and ground. Half the length of the valve tappet is 1/32 in. x 5/8 in. oil recess groove, the tappet body being hollow, oil passing up through the tappet body and is by-passed into this groove by a 5/32-in. drill hole through the tappet body. The adjusting tappet screws into the tappet body and locks with a jam nut. The tappet guide is soft steel, 3 in. long, and held down by crow feet.

Governor

The governor is a fly ball type, and is bolted on the camshaft gear in the front. The motion is taken from the governor by a sliding sleeve collar on the end of the camshaft, from there by fork bell crank arm, then to the governor valve by a rod.

Oiling System

Oiling system is a forced feed and splash system. The oil is forced from the sump by a gear pump driven by a shaft and spiral gear off the camshaft. From the oil pump the oil goes to a conduit tubing, running lengthwise of the motor on the inside of the case. It is by-passed from the conduit through drilled holes through the webbing of the case to the crankshaft bearings, from the crankshaft bearings through drilled cheeks and pins to the connecting rods. Casted on the outside of the crankcase are hollow ribs, one of these ribs running up the crankcase where the connection to the conduit pipe in the upper half of the crankcase is connected. The other hollow rib runs along the crankcase to a pressure release valve, which by-passes the oil back into the sump.

Water System

Centrifugal water pump, 4 in. in dia. with a bronze impeller and a cast iron housing. The water enters through the center of the pump and is discharged directly overhead. The intake and discharge are 1 in. The water pump is located on the front end of the motor on the upper half of the crankcase. It is driven by a cross shaft with a worm and spiral gear, the spiral gear being located on the camshaft behind the timing gear. The magneto is driven from the other end of this shaft. The cross shaft

is supported by two bronze sleeve bearings 3 1/2 in. long. The worm gear on the cross shaft is pressed on and held by a straight key, backed up with a ball thrust bearing.

Ignition

Ignition system is a simple system high tension type ZU4 Bosch magneto. The magneto is anti-clockwise, the advance and retarding is by the conventional way by advancing the breaker box. For checking up the secondary rotor a celluloid window is located opposite contact number one in the secondary distributor. Magneto is located on the right-hand side of motor, and is driven by a gear from timing gear case.

Carbureter

Carbureter is a vertical Pallas, type V, 1 1/2 in., with a 26 mm. venturi throat. The float is of cork and shellac. The idle adjustment is by a stationary well. The carbureter is cast aluminum, with no special features. The high speed is through a well running angular through the venturi, the fuel being restricted by a compensator. The throttle valve is a butterfly type. Carbureter has a hot air attachment.

Fan

22 in. in dia. Three blades. Sheet steel. Riveted to steel casting with machined fan pulley on rear. Fan shaft is mounted on ball bearing with adjustment in the rear. The fan bracket is made of steel casting, having a clamped end, which holds a vertical shaft with an adjusting nut. The vertical shaft is threaded, having a check nut. This shaft is clamped into fan bracket by a clamp bolt and nut. A straight key 2 1/4 in. long fits in key at clamped end of fan bracket. This prevents the vertical shaft from turning sideways.

Weights

Connecting rod and piston complete, 13 lbs. 5 ounces.
Valve tappet assembly, 13 ounces.
Valve, 7 ounces.
Valve spring, 3 ounces.

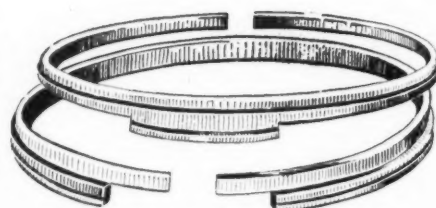
Remarks

General design is very similar to the average American motor of this class, although practically everything is of cast iron. It would make a good service job, as most parts are accessible and easily disassembled. The greatest difficulty is having to remove the timing gear case before the lower half of the crankcase can be removed, as studs from the front of lower crankcase extend through timing gear case. The workmanship is above the average.

Double Rings and Triple Locks

IN the accompanying illustration is shown a two-piece piston ring, which can be triply locked and inserted in the piston groove as one piece. It is claimed for these rings that they remain in position without binding under the expansive effect of excessive temperature, while at the same time the exploding gases are prevented from leaking past the piston. The manufacturers are the Ingram Motor Co.

These rings are made from individual castings of gray iron. The lower section is cut away accurately to receive the upper, from which an overhanging lip extends downward to seal the juncture and prevent the turning of one section upon the other and opening of the ends. Secure locking prevents distortion of the rings during the compression and power strokes and guards against ragged joints, which cut the cylinder walls and form by-passes for



Ingram triple seal piston ring

gas and oil. When the ends of the upper section of the ring open any distance, they are sealed by the lower section, an open space in the one being opposite a closed space in the other.

Radial tension is given the rings by a patented rolling process, which is said to insure uniform tempering and continued conformity of the rings to the circular shape of the cylinder. Equal contraction and expansion throughout the circumferences of the sections are also objects kept in view in the design.

New Crank Motion Embodied in Engine

In this interesting article Mr. Heldt discusses the piston arrangement of a new motor and the theory of conversion of waste heat into mechanical energy. In this case the explosion takes place between two pistons.

By P. M. Heldt

TWO of the fundamental requirements that must be met if the best possible fuel economy is to be obtained in an internal combustion engine, are that the compression chamber must have the least possible area for the volume of the charge at the moment of ignition, and that the gas must expand very rapidly immediately after ignition. If the charge in the combustion chamber is well proportioned and homogeneous all of the chemical potential energy of the fuel is very quickly converted into heat energy. This store of heat energy is decidedly unstable, however.

The heat is carried by the gases, but it begins to escape from the gases immediately through two channels. Some of it is converted into mechanical work through the piston, connecting rod and crankshaft and some is lost by transmission through the cylinder walls to the cooling water.

Both processes of energy transfer continue till the end of the power stroke, and the heat then still remaining in the gases passes off and is lost with the exhaust. The heat converted into mechanical energy is utilized, while that passing into jacket water or out with the exhaust is lost.

In order to make the conversion of heat into mechanical energy as efficient as possible, it is necessary first that the loss of heat to the cooling water be restricted as much as possible. This loss is in direct proportion to the surface area with which the burning gases are in contact at any particular stage of the cycle.

A distinction must, however, be made between two kinds of combustion chamber wall—that in direct contact with water on its outer side and that which is not directly cooled by water. The former cannot attain a temperature much higher than the boiling point of water, whereas the other kind of combustion chamber wall, represented by the piston head, will attain a temperature several hundred

degrees higher, and since the flow of heat from the burning gases into the combustion chamber wall is directly proportional to the temperature difference, heat will flow not nearly so readily into the piston head as into the water-cooled cylinder wall, unit of area for unit of area. Therefore, if it is important to make the total wall area of the combustion chamber at the moment of ignition small, it is doubly important to have the water-cooled area small.

The other factor which affects the loss through the combustion chamber walls is time. Just what determines the proportion of heat loss to the cylinder walls and the conversion of heat into mechanical energy may seem obscure, but if we take an infinitesimal duration for which we can assume the combustion chamber wall area constant, the loss through the combustion chamber walls will be of a certain value, but the conversion of heat into mechanical work during this short period will be in proportion to the distance moved by the piston or, in other

words, to the speed of the piston.

Higher piston speed will increase the work done upon the piston in a very brief period of time, but will not increase the jacket loss corresponding to that time. Hence it will increase the efficiency of heat conversion. While this holds for any part of the piston stroke, the relation is of particular importance during the first part of the stroke when the temperature of the burning gases is exceedingly high.

An engine, in the design of which the above outlined principles have been kept in view, is being developed by the Petroleum Motors Co. The engine is of the double piston type, each cylinder containing two pistons, between the heads of which the explosions take place. Inlet and exhaust valves are located in a shallow valve pocket at the side of the cylinder, which, however, is cut off from the combustion chamber at the moment of explosion. At

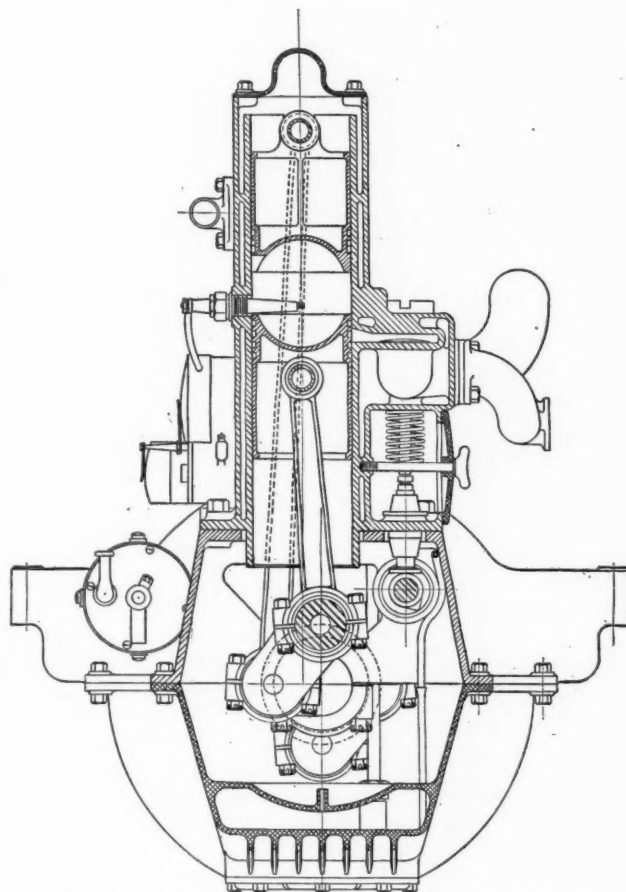


Fig. 1—Section through double piston engine of Petroleum Motors Co.

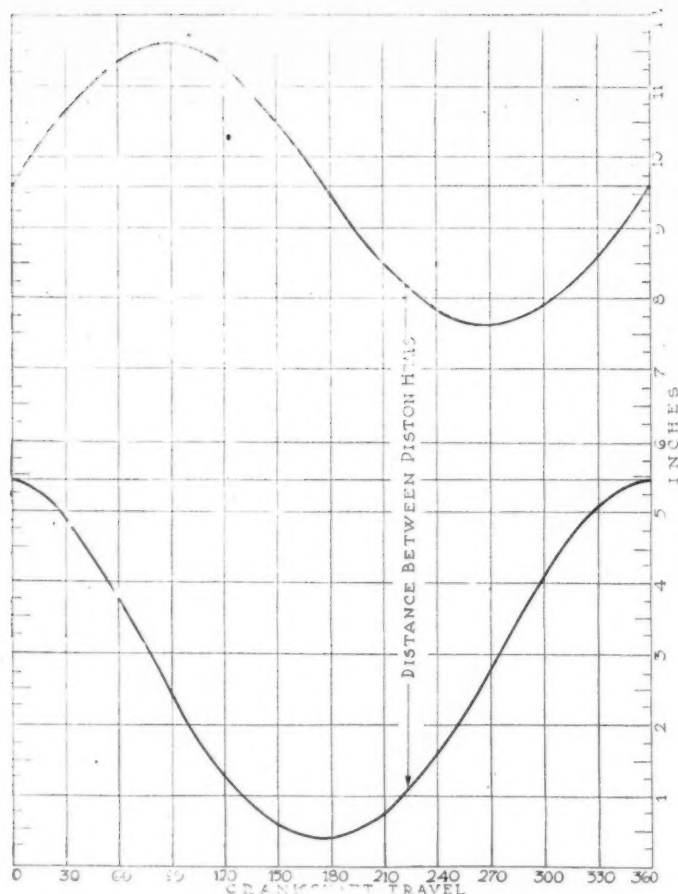


Fig. 2—Motion curves of lower and upper pistons

the time the ignition takes place, the conditions are most favorable, as not only is the combustion chamber at that time of substantially spherical form (which latter is the ideal form), but most of the wall area is directly cooled and therefore would not abstract heat from the burning gases so rapidly.

The advantage thus gained entails some accompanying disadvantages, however. In the first place, it is more than likely that, owing to the lower cooling effect of the wall area, the compression in the cylinder cannot be carried quite so high as if the whole combustion chamber were practically entirely surrounded by a water-jacketed wall.

Secondly, the charge trapped in the valve chamber is ignited very late in the stroke and is utilized therefore at low efficiency.

Thirdly, if the combustion chamber at the moment of explosion is approximately a sphere the compression pressure can only be very low, with an effective stroke equal to about one and one-half times the cylinder bore. A cylinder of d inches bore and $1.5d$ inches stroke has a piston displacement of

$$\frac{d^3 \pi}{4} \times 1.5d = 1.176d^3$$

The volume of a sphere of d inches diameter is $0.524 d^3$, hence if the sphere represented the whole compression space the compression ratio would be only

$$\frac{1.176 + 0.524}{0.524} = 3.25$$

But in addition to the compression space within the cylinder proper there is a very considerable compression space in the valve pocket, and if a spherical combustion chamber is wanted the compression ratio will of necessity be low.

In the sectional view the spark plug is shown formed with an extension at the inner end which brings the spark gap substantially at the center of the compression chamber. This arrangement, while ideal from the standpoint

of quick inflammation, would hardly be practical, on account of the overheating of that portion of the plug extending into the combustion chamber, and consequent pre-ignition, if the engine were run for any length of time under full load.

The engine illustrated by the cross-sectional view herewith has a bore of $4\frac{1}{8}$ in. The lower piston is connected through a connecting rod $10\frac{1}{4}$ in. long to a crank having a throw of 5 in., and the upper piston through a connecting rod 23 in. long to a crank having a throw of 4 in. The two cranks are not in line, the long-throw crank leading the other one by 90 deg. It is this angular displacement of the two cranks, together with the fact that the crankshaft axis is offset from the cylinder axis, which results in a very peculiar relative piston motion. In one of the illustrations curves of piston travel from both the lower and the upper pistons are traced, the two curves being so located with relation to each other that the vertical distance between them always represents the distance between the cylinder heads. The scale at the bottom of the diagram represents the crank travel in degrees, starting from the upper dead center position of the long-throw crank.

The offset of the crankshaft axis is $\frac{3}{4}$ in. and this is in the opposite direction from what it usually is. Therefore, when the long-throw crank is in the "straight-up" position the corresponding piston is nearly, but not quite, at the upper end of its travel. As this piston is already moving downward, and the upper piston is at this moment moving rapidly upward, it is obvious that the point of maximum compression occurs somewhat ahead of the moment when the long-throw crank is in the straight-up position.

In Fig. 3 are shown the relative motion between the two pistons, and it will be seen from this that the pistons are closest together when the long-throw crank has still 35 deg. to turn before it reaches the straight-up position. The pistons are farthest apart when this crank has turned through an angle of 130 deg. from the straight-up position. Consequently, the suction and power strokes are completed in about 165 deg. of crank motion. Therefore, the average virtual piston speed is greater during the suction and expansion strokes than during the compression and exhaust strokes.

Although the lower piston has a stroke of substantially 5 in., and the upper piston of 4 in., making a combined

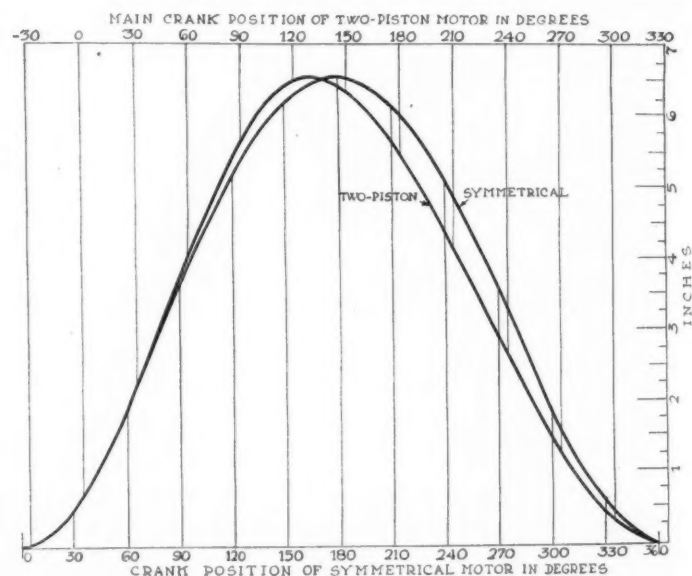


Fig. 3—Curve of relative motion of the two pistons and of a single-piston symmetrical engine of the same effective stroke

piston travel of 9 in., the effective stroke, or the difference between the maximum and minimum distances apart of the two pistons, is only about $6\frac{3}{8}$ in. Consequently, it is necessary for the pistons to travel a distance about 35 per cent greater than would a single piston in an engine of the same stroke.

For the sake of comparison, a curve of piston motion of a single piston symmetrical engine is also drawn in Fig. 3. The advantage of a high average virtual piston speed for the power stroke is somewhat reduced by the fact that during the first half of the power stroke the expansion is practically at the same rate in the double piston engine as in an ordinary single piston symmetrical engine. The scale of crank travel at the bottom of the diagram relates to the symmetrical engine and the curve of effective piston motion of the double piston engine is drawn in so that the top dead center position for the two engines coincides.

The power stroke in the two-piston engine corresponds to a crank motion of 165 deg., while the compression

stroke corresponds to a crank motion of 195 deg. Consequently, the former is made in 15 per cent less time than the latter. Unfortunately, most of the gain in speed is made during the latter part of the stroke, where the advantage of high speed is less, owing to the low temperature then prevailing in the combustion chamber. During the first half of the stroke the two curves are practically identical.

The offset of the crankshaft relative to the cylinder axis being in the opposite direction to that in which crankshafts are usually offset, the effect is to increase rather than to decrease the side thrust of the piston on the cylinder walls. This applies particularly to the lower piston, as the connecting rod of the upper piston is so long that its angularity is very slight even when it is at its maximum.

Several models of the machine described have been built, and we are given to understand that they have been operating quite satisfactorily. At the present time a 4-cylinder engine of this design for truck work is under construction.

Cape-to-Cairo Airline

IT was Cecil Rhodes' pet scheme to establish a direct line of communication by land from "Cape to Cairo," to link up the Cape Colony of those days with the capital of Egypt. Rhodes died before he could carry out his plan and the direct land line is still a thing of the future, but the British Air Ministry has just issued a statement announcing the completion of an all-British air-route between Cairo and the Cape.

In December, 1918, three survey parties were dispatched to explore and as far as possible prepare the most suitable air route through Africa. These parties were instructed to get into personal touch and work in conjunction with the administrative authorities in each zone, and the happy result of this policy has been very marked.

No. 1 party dealt with the section from Cairo to Nimule (Soudan). No. 2 party dealt with the section Nimule to Abercorn (Rhodesia), and No. 3 party dwelt with the section Abercorn to Cape Town.

Each party, consisting of six officers and a certain number of other ranks, collected all available information as to its own particular section, and with the aid of parties of natives, cleared aerodromes and landing-grounds at distances of about 200 miles or less along the route selected.

The route follows the Nile from Cairo to Wady Halfa, thence the railway to Shereik, from which place it conforms to the course of the Nile to Khartoum.

From Khartoum the course is to the west of the White Nile to Eleri, and then almost due south through the Uganda Protectorate to the northern shore of Lake Victoria. Partly owing to the extremely disturbed nature of the atmosphere above the lake the route skirts it on the eastern side, passes over what was formerly German East Africa to the southern end of Lake Tanganyika, and thence crosses Northern Rhodesia to Livingstone, whence a southeasterly course is followed to Bulawayo. The next town of importance on the route is Pretoria, and so by Johannesburg and Bloemfontein across Cape Colony by Beaufort West to Cape Town.

The preparation of many of the landing-grounds involved a great deal of labor. In places it was necessary to cut aerodromes out of dense jungle, to fell thousands of trees, and dig up their roots, while the soil of innumerable ant-hills had to be removed by hand, being carried in native baskets, as practically no barrows or other equipment were available. Moreover, where tsetse fly prevailed no cattle could be utilized for cartage purposes.

To those unacquainted with this country it will come as a surprise to learn that ant-hills are often 25 ft. in height and between 35 and 45 ft. in diameter. As one cubic yard of ant-hill weighs about 2670 lb., some idea may be gathered of the labor necessary to clear the ground at such a place as, for instance, that at N'dola, in Northern Rhodesia, where 700 natives were working from April to August of this year and roughly 25,000 tons were removed from the ground cleared. Blasting was found to be unsuitable.

The first portion of the journey along the Nile Valley should present no particular difficulties to air traffic. Communications by telegraph, river and railway are fairly good, and landings can be safely effected, if necessary.

In the central zone, however, difficulties are more numerous. Most of this is covered with dense bush and tropical forest, and landings at other than the prepared grounds will be exceedingly dangerous if not impossible. In some parts there is no land transport, with the resultant difficulty of providing the necessary stores at the aerodromes. Moreover, at some places tsetse fly prevents the use of cattle so that, failing the provision of light motor transport—for which special roads would have to be prepared over some sections—native bearers will have to be used for the carriage of stores. Shortage of water and the frequent occurrence of areas infested by mosquitoes and white ants increase the difficulties.

For most of the southern section, with the exception of Northern Rhodesia, conditions are considerably better. Railway and telegraph facilities are good, and stores can be distributed without much difficulty. The climate, too, is healthy, and forced landings could be negotiated.

There are wireless stations at various points within touch of the chain of grounds. Generally speaking, cable and land line communications are good, with the exception of those across certain sections such as that between Abercorn and N'dola and others in Central Africa, where considerable delay may be experienced.

The total distance by existing methods of communication is 6,223 miles, for which 59 to 74½ days would be required. Against this the total flying distance of the aerial route should not exceed 5,200 miles, as the pilot will stop only at the main stations. Taking 100 miles an hour as fair average flying speed under favorable conditions, and when the route has become firmly established, only 52 hours actual flying time would be required to traverse the entire continent.

Adapting Engines to Use of Available Fuel

This very practical paper was read before the S. A. E. meeting in New York by Jesse G. Vincent of the Packard Motor Car Co. The question involved is one that is before every engine builder and vehicle user of to-day. The discussion adds to the appreciation of the various views on the subject

IT is desirable that the experimental cars on the road to-day should be operated on the fuel that will be marketed generally two years hence. From the accompanying curves it will be seen that the end-point of the average gasoline has been rapidly ascending in the last four years and is now but little less than the end-point of kerosene. The gravity, Baumé, readings are slowly descending but the initial boiling point has not undergone much change. As long as this latter condition holds we shall not have much trouble in starting engines in cold weather, but the use of a tight-fitting choke will become more and more of a factor in determining how quickly the engine will fire, since at low temperature we can volatilize only the lighter constituents of the fuel, and as the percentage of these lighter constituents in relation to the whole goes down, we must get a larger amount of gasoline into the cylinders to have enough of the lighter constituents to start combustion.

There was a time when we pointed with pride to the frost on a bare aluminum intake header. This applied when we were dealing with fuels of about 80 deg. Baumé, which vaporize at normal temperatures in the intake manifold. Nowadays we are dealing with fuels which refuse to vaporize at ordinary temperatures in the header. In the course of some experiments with glass manifolds I found that when using 56 deg. Baumé gasoline it is necessary to put the mixture into the cylinders at about 180 deg. F. to secure a perfectly dry mixture. For all practical purposes, however, the mixture can be somewhat wet and a mixture temperature of 120 deg. F. is about the minimum to be used.

Spark-Plug Fouling

There are several reasons why the mixture should be introduced in as dry a condition as possible. First in importance is that of spark-plug fouling. Repeated experiments have shown that such fouling in the great majority of cases is not due to over-oiling, as commonly supposed, but to the presence of wet fuel on the plug which in connection with the small amount of carbon that is formed on the porcelain apparently has the property of making the surface a sufficiently good conductor to enable the high-tension current to leak over the surface of the porcelain rather than jump the gap. Clean oil is a good insulator, and when a plug does not fire because of oil, this is due to the fact that the oil acts as an insulating material between the electrodes. If the mixture is introduced into the cylinders in a dry state and does not condense afterward, it is obvious that no wet fuel will appear on the porcelain. Practical experience of many months on several cars has shown that this is the secret of preventing spark-plug fouling.

Second in importance is the question of performance

with a cold engine. During the past few years we have used thermostats, water-jacketed headers, hot-spots and heated air intakes, but winter operation of cars is becoming less satisfactory each year.

The third item in order of importance is the contamination of the lubricating oil by fuel which passes the pistons. This is a serious problem, for few owners will go to the trouble of draining off the oil at comparatively short intervals in winter. In consequence the lubricating system soon becomes filled with a mixture of fuel and oil of little or no lubricating value.

Minor Problems

There are many minor questions involved when we try to distribute and burn a wet mixture. Many have tried numerous types of intake headers to find which insures the nearest approach to equally proportioning the air and gasoline to each of the various cylinders. We are often using gas velocities in the intake header exceeding 100 m.p.h. and it is therefore to be expected that the liquid gasoline will separate from the air stream, due to its greater inertia. Of course, when the gasoline is turned into a dry gas it behaves just like air and takes the turns nicely along with the air. The failure to obtain prompt response when opening the throttle quickly when using a wet mixture is also undoubtedly due to the fact that the air will accelerate more quickly than the liquid gasoline particles, with the result that the engine either "lies down" or spits back. When a dry mixture is used we can step on the throttle and get instant response.

I take it that we are now all agreed that a dry mixture is desired. There remain to be examined the various methods of obtaining this result. The commonest one now employed is to utilize some of the heat contained in the exhaust gases, and since there is expelled in the exhaust from 20 to 40 per cent of the heat units contained in the original gasoline, depending upon the engine speed and other considerations, it would appear that this is the most practical and economical way to obtain the result.

Theoretically it undoubtedly is, but practically, in some cases, the method presents serious objections. If we assume that the intake and exhaust manifolds are in some manner constructed integrally, it is obvious that the temperature of the intake walls will vary in proportion to that of the exhaust walls. This, of course, means that at high speed and under heavy load the walls will be very much hotter than at low speeds and light loads. It is therefore obvious that if the intake header is sufficiently hot to do the job at low speeds and light loads, it will be altogether too hot at high speed and heavy loads to obtain the maximum volumetric efficiency of the engine. Of course, there are many cases where a high volumetric efficiency under heavy loads or at high speeds is not essential,

so that this solution gives pretty fair results. We are all, however, striving to get the most power possible out of the least engine, and it certainly hurts to cut 10 or 20 per cent off the maximum output of the engine to insure a dry mixture at low throttle and light loads.

Compromises

Then again there are various compromise schemes most of which are based on the theory that it is possible to locate a very hot spot at such a point that the heavy particles of the fuel will be thrown against this surface and vaporized, whereas the air and the lighter particles will be diverted from the hot-spot by the particular design of the header. This would be fine if it were possible to get the hot-spot hot enough under low throttle conditions. It is undoubtedly a good compromise scheme and does not detract from the volumetric efficiency of the engine to the extent that the regular exhaust-jacketed job does.

Supplying the necessary heat electrically is impractical, because if the fuel consumption amounted to 2 gal. or 12½ lb. per hour, heating the fuel and air from 40 deg. F. to 120 deg. F. and completely vaporizing the fuel requires 1.34 kw.-hrs. or 223 amperes at 6 volts. It appeared desirable to evolve some simple inherently automatic method of supplying the heat, not possessing any of the disadvantages cited above. Assuming that there are 19,000 B.t.u. in 1 lb. of gasoline, the necessary heat could be secured from the complete combustion of 0.24 lb. of gasoline per hr., providing we could attain a 100 per cent heat transfer. We do not, of course, obtain 100 per cent efficiency with the scheme I am going to describe, but I believe that from a thermal standpoint you will agree that it is a very efficient arrangement or one representing but very small heat losses.

The principle of this device is to take advantage of the difference in pressure existing on either side of the carbureter butterfly-valve and cause a small amount of the combustible mixture to pass through a passage which is in parallel with the main carbureter passage, burn this mixture in a suitable burner and then allow the burnt gases to mix with the incoming main supply to the engine above the throttle. It was evident immediately that this general scheme would be at its maximum efficiency under low throttle and light load conditions; an intense heat is generated very promptly under these conditions, which are obtained when starting up and idling.

On the other hand, under wide-open throttle conditions, when we wish to maintain the volumetric efficiency of the engine as high as possible, but very little mixture passes through this "shunt" passage and a negligible amount of heat is produced in the burner. Of course, the reason that the mixture need not be heated for wide-open throttle conditions is that combustion is largely assisted by the increased turbulence, increased compression pressures and

naturally higher jacket-water temperature.

Four Main Points

There are four main units which combine to give the desired result. They are briefly as follows:

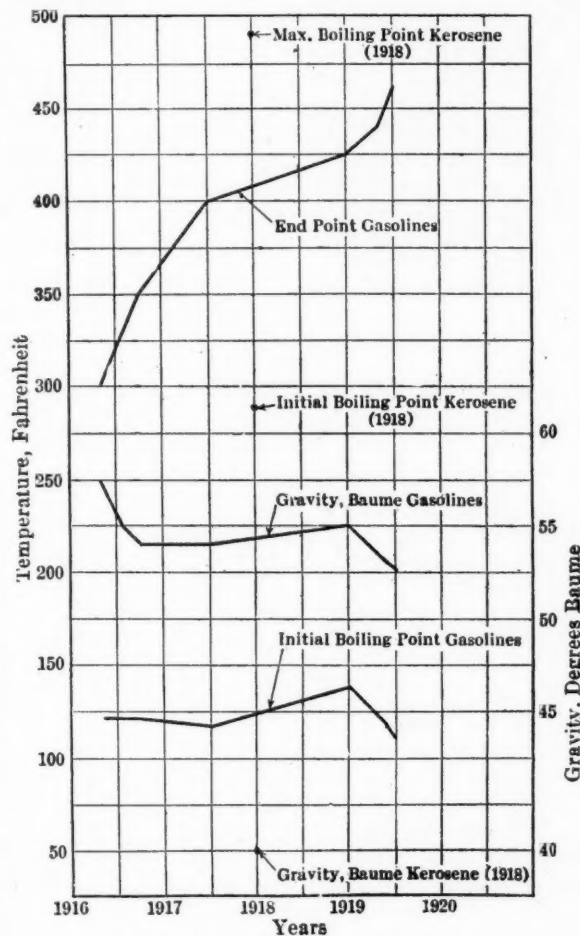
- (1) A special inlet manifold which has a water-jacket as well as a combustion jacket.
- (2) A burner which is attached to the combustion jacket.
- (3) A vaporizer or miniature carbureter which is used to furnish the mixture for the burner.
- (4) An auxiliary ignition breaker and coil which is used to furnish the spark for the burner spark-plug.

The manifold as shown on the accompanying drawing is of the conventional construction except for the additional jacket used for the hot gas which communicates with the main intake passage through the two hollow "suction" plugs shown at *a*. The burnt gas joins the main mixture after coming through these holes and the proportions are such that at no time does the burnt gas come into contact with the new mixture at a sufficiently high temperature to preignite the mixture.

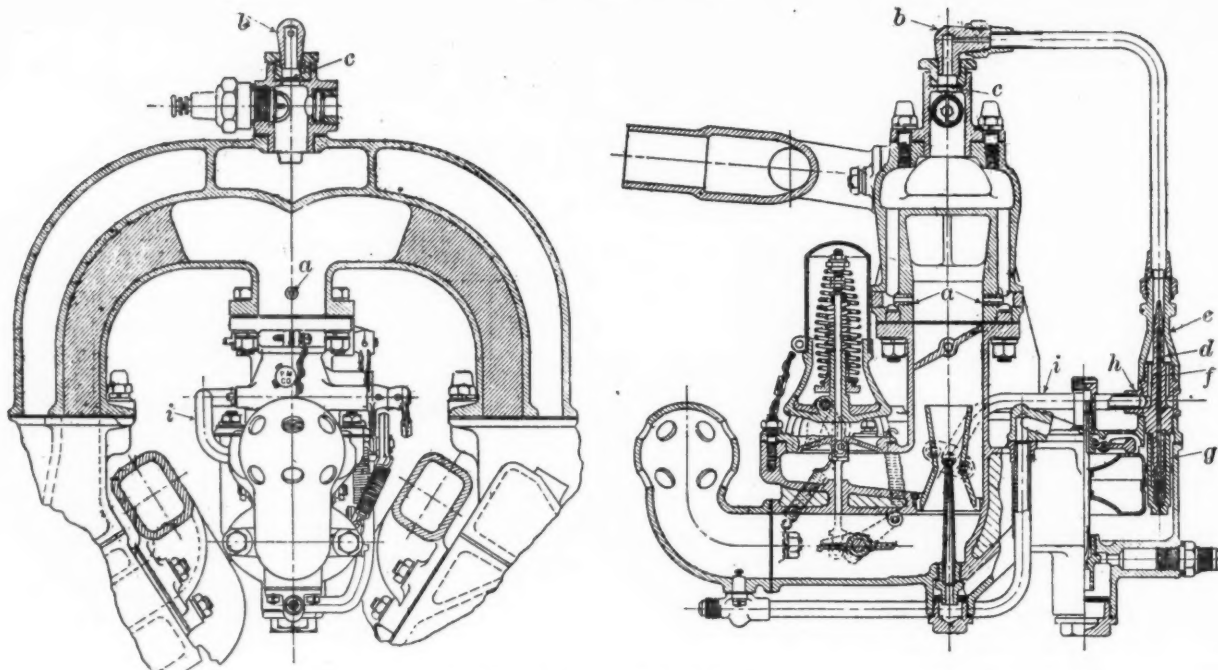
The burner body is fastened to the manifold by the two-bolt flange shown, and in the burner body there is formed a combustion chamber into which a spark-plug fitted with a wide gap is inserted, as well as an observation window of heat-resisting glass which permits the action of the burner to be observed at all times. The mixture from the vaporizer is supplied by a ⅜-in. copper pipe and enters the combustion chamber after passing through a calibrated hole in the elbow shown at *b* on top of the burner and a screen *c*. The purpose of the latter is to assist in the atomization and even distribution of the incoming mixture.

The mixture is supplied by the vaporizer shown at *d*, which is composed of four main parts, the choke *e*, the jet *f*, the jet sleeve *g* and the air intake *h*. This vaporizer is intended to function as a carbureter through a limited range of depressions. It is constructed on the general principles embodied in several different types of plain tube carbureters and relies on the fact that a submerged jet exposed to atmospheric pressure will feed a fixed quantity of fuel, and that by suitable control of the depression over this jet the flow of fuel can be accelerated in just the degree required for an increasing suction and supply of air. Accordingly the level of gasoline in the sleeve *g* rises and falls as the suction in the venturi *e* decreases or increases. Control of the mixture supplied by this miniature carbureter to meet various temperature changes and starting conditions is attained by the simple means of coupling the air intake *h* to a pipe *i* which takes its air from the auxiliary air supply of the carbureter, as shown.

In connection with the air-valve type of carbureter, around which this device has been designed, there is a



Change in fuel characteristics since 1916



Sectional views of fuel heater

dash adjustment that permits the driver to control the depression existing in the auxiliary air supply passage so that when starting out on a cold day both the main and the auxiliary carbureters can be made to supply a richer mixture simultaneously by means of the dash adjustment.

The high-tension current for the burner spark-plug is supplied by an independent ignition coil, the primary circuit of which is wired in parallel with the regular ignition circuit; the extra coil is controlled by a separate contact-breaker. The latter is operated by the same cam as the regular engine ignition contact-breaker. It will thus be seen that the burner spark-plug is operating whenever the engine ignition is operating, and in the case of the twelve-cylinder engine there are three sparks in the burner per revolution of the engine. I have not found it advisable to cut off this spark or control it in any way, since except for the small amount of current used by the extra coil there appears to be no disadvantage in allowing it to operate continuously.

How the Device Operates

In operation, when the engine is idling, combustion takes place in the burner silently and continuously and a bluish-green flame completely fills the combustion chamber. This flame diminishes in intensity as the throttle is opened and the depression in the main intake header is thereby decreased, the general result being that for ordinary driving conditions up to 25 m.p.h. a mixture temperature of 150 to 180 deg. F. is maintained, giving perfect distribution, excellent acceleration, absence of spark-plug fouling and elimination of dilution of the lubricant in the crankcase. At higher speeds and wider-throttle opening the influence of the combustion heater gradually decreases until at wide-open throttle it is practically out of action, which is exactly the condition desired. This combination has permitted the running of a twelve-cylinder engine on kerosene at moderate driving speeds with practically the same results as when using gasoline, but when using kerosene there are critical temperatures below which we cannot go without considerable spark knock. The problem of burning kerosene is, of course, something that we do not yet face, but the design of this heater can be modified to permit any shape of temperature-load curve desired. The combustion heater as at present

constructed does not permit us to start on kerosene, but simple modifications would permit this to be accomplished.

One question that naturally arises is: What effect has the combustion heater on gasoline economy? I have conducted a great many experiments in an endeavor to answer this question. A series of tests was made on the dynamometer, the results of which are shown in the accompanying table. In these tests the gasoline consumption of the engine and of the burner were measured separately. It will be noted that the consumption of the burner, when idling, was 0.066 gal. per hr. This is slightly over $\frac{1}{2}$ pint per hr. It will also be noted that under

GASOLINE CONSUMPTION OF A 3 BY 5-IN. TWELVE-CYLINDER ENGINE USING COMBUSTION HEATER

Engine Speed, r.p.m.	Equivalent Car Speed, m.p.h.	Brake Horse-power	GAS CONSUMPTION, GAL. PER HR.		Burner Consumption	Temperature of Manifold, deg. Fahr.
			Engine	Burner	Engine Consumption	
350	Idle	.....	1.02	0.066	0.064	218
400*	9.5	2.33	1.32	0.054	0.041	210
800*	19.1	5.07	1.80	0.054	0.030	200
1,200*	28.6	10.00	2.40	0.066	0.027	187
1,600*	38.2	16.53	3.30	0.114	0.035	156
1,600	38.2	32.00	4.27	0.102	0.024	150
1,600	38.2	63.00	7.20	0.060	0.008	146

*Assumed average driving conditions.

average driving conditions the engine fitted with a combustion heater may consume approximately 3 per cent more than one without the heater, but it is possible to save a considerable amount of gasoline under such driving conditions as call for frequent accelerating, owing to the improved performance obtained with a dry mixture. In cold weather and even in hot weather it is possible to run with a much leaner mixture when the mixture is dry, and this will more than offset the slight amount of gasoline which the burner uses. I believe that taking an average over city and country mileage there will be little, if any, difference in the matter of gasoline consumption in moderate weather between a car fitted with a combustion heater and one not so equipped, but that there will be a noteworthy saving in cold weather.

Discussion

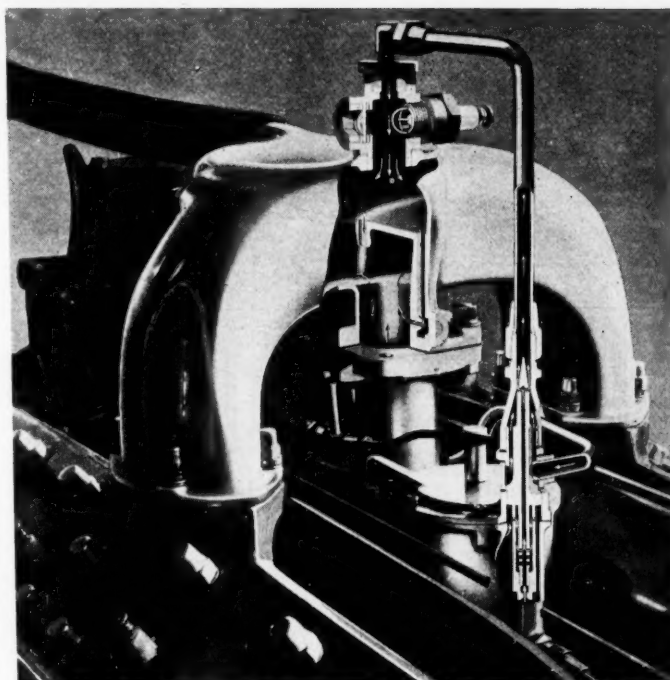
Mr. Wall said that it was very important that the gas should not cool off again after it had been heated in the carbureter. This was difficult to prevent, unless the intake manifold was inside the cylinder block. It had been found to make a great deal of difference with a hot spot manifold whether the hot spot was at the bottom of the manifold or elsewhere. The shape of the manifold was one of the important items. Attempts had been made to so design the manifold that the unvaporized gasoline would reach the hot spot at low speed but not at high speed.

There was an appreciable difference in the horse power developed in engines with jacketed and unjacketed combustion chambers, respectively. The heat given to the charge during the inlet stroke expands it and causes a smaller amount of charge to be taken in.

Hugo Gibson said that one cannot convert high boiling point gasoline into a dry gas except by supplying heat to it and giving it time. Everybody was trying to get the most power out of an engine of a given size and in so doing was doing the wrong thing. What was wanted to-day was the maximum amount of work out of a unit volume of gasoline purchased.

Dr. Dickinson said that the question had been raised as to which were the characteristics of fuel which were really important. It was generally agreed that gravity was not one of these while, on the other hand, volatility was. The question then arose whether all troubles were due to the high end point or whether it was the main volatility that counted. One of the troubles experienced was that of spark plug fouling. This was generally ascribed to an excess of oil in the combustion chamber, but he had been able to produce it with only a very slight amount of oil in the engine. A deep layer of soot could be quickly deposited on the spark plug insulator by feeding an excess of gasoline to the engine. Moreover, unvaporized fuel was just as good an insulator as lubricating oil, and if drops of it should adhere to the spark points they would cause missing of the spark, the same as oil.

Mr. Mock raised the point of the inlet manifold temperature required for different throttle positions. He said that with a fuel having an end point of 460 deg. F., there would be no loading of the manifold if the temperature within the manifold could be maintained at between 80 and 100 deg. F. If heat is applied in normal operation, it is surely necessary to supply heat when the engine is running on low throttle. One of the reasons for this is that the expansion of the air as it passes the



Packard "Fuelizer"—This device is now being fitted as regular equipment on all Packard passenger cars. A technical description is contained in Colonel Vincent's S. A. E. paper

throttle has a cooling effect, and the lowering of the pressure as the throttle is passed causes more fuel to evaporate, which results in a further decline in temperature.

A series of experiments had been made to determine what was the best temperature of the air entering the carbureter. At 61 deg. F. the engine did not run very well. At 71 deg. F. it ran nicely and produced a good deal more power. At 100 deg. F. it ran still better, the power being about the same. At 125 deg. F. the power began to drop.

In closing the discussion Mr. Vincent said that the device he had described probably worked best on a V type engine. The difficulty with the hot spot type of manifold was that it did not heat up quickly enough and that it did not stay hot enough. Besides, equal distribution was of the same importance as mechanical balance. At high speeds he had been able to obtain splendid operation without the fuel heater, as the piston furnished sufficient heat for evaporating the fuel, but that did not take care of the distribution. An over-rich mixture had much to do with the fouling of spark plugs.

How Westinghouse Selects Young Engineers

EVERY year the Westinghouse Electric & Mfg. Co. adds to its organization more than 200 electrical and mechanical engineers. They are young men, most of them, trained in analytic methods of thought, but lacking at first in knowledge of manufacturing methods and in need of personal contact with engineers and men of business, before stepping into positions of trust and responsibility.

To assist young men of this type in determining the special work toward which they incline, and for which they are particularly adapted, the Westinghouse Co. has perfected its selective system, which is a combination of post-graduate training and practical experience. As the electrical field is a very broad one, the young engineer re-

quires at first a birdseye view of the whole, and accordingly he is shifted from one department to another during the first few months of his connection with the company. Gradually he is allowed to gravitate toward the point of maximum attraction, and as soon as practicable specialization begins in earnest.

The courses open to the technical graduate include design, application and research, in either electrical or mechanical engineering, as well as factory management and service, to which are added commercial courses, either domestic or international. Special training is provided for men who expect to enter the teaching field or operating work.

The World's Air

Compiled for Automotive Industries

Nationality	Type	Name of Manufacturer	Year	Type Construction	Use	Crew, Etc.	DIMENSIONS				
							Length, Ft.-In.	Height, Ft.-In.	Width, Ft.-In.	Diameter, Ft.-In.	Capacity, Cu. Ft.
United States	B.	Goodrich A.	1917-8	Non-rigid.	Submarine Scout.	2	167-0	50-0	.....	33-0	80,000
United States	B.	Connecticut B.	1917	Non-rigid.	Submarine Scout.	2	165-0	45-0	.....	31-6	77,000
United States	B.	Goodyear F.	1917	Non-rigid.	Submarine Scout.	2	160-0	45-0	.....	31-6	77,000
United States	B.	Goodyear F.A.	1918	Non-rigid.	Submarine Scout.	2	163-0	45-0	.....	31-6	84,000
United States	C.	Goodyear; Goodrich.	1918 (Late)	Non-rigid.	Coast Patrol.	4-7	192-0	46-0	43-0	.....	182,000
United States	D.	Goodyear; Goodrich.	1919	Non-rigid.	.....	4	198-0	54-0	43-0	.....	180,000
United States	Old Class DN 1.	Connecticut.	1916	Non-rigid.	.....	7	175-0	50-0	35-0	.....	115,000
United States	E.	Goodyear.	1918	Non-rigid.	Submarine Scout.	3	163-0	45-0	.....	31-6	95,000
United States	F.	Goodyear.	1918	Non-rigid.	Submarine Scout.	3	162-0	45-0	.....	33-6	95,000
United States	Rigid	.....	Designed 1919	Rigid.	Data omitted—	Publication not authorized to date.	.....	.....	.....	.....	.....
British	Astra Torres Coastal.	.....	.....	Non-rigid.	Submarine Scout.	5	196-0	52-0	39-6	.....	170,000
British	C Star.	.....	.....	Non-rigid.	Convoy Escort.	5	218-0	57-6	49-8	.....	210,000
British	North Sea.	.....	.....	Non-rigid.	Long Distance Reconnaissance	10	262-0	69-3	56-9	.....	360,000
British	SS.	Vickers	1916	Non-rigid.	Submarine Scout.	.....	144-0	.....	.....	28-0	65,000
British	SS Zero.	Vickers	1917-8	Non-rigid.	Submarine Scout.	3	143-0	46-0	32-0	.....	70,000
British	SS Twin.	Vickers	1918	Non-rigid.	Submarine Scout.	4-5	165-0	49-0	35-6	.....	100,000
British	Parseval.	Vickers	1917	Non-rigid.	.....	.....	301-0	.....	.....	51-0	364,000
British	R9.	Vickers	1917	Rigid.	.....	14	520-0	76-0	.....	53-0	800,000
British	R23-R26.	Vickers, Beardmore, A. W. & Co.	1917-8	Rigid.	Sea Patrol.	.....	535-0	75-0	.....	63-0	900,000
British	R23K, R27, R29.	.....	1917-8	Rigid.	.....	.....	539-0	.....	.....	53-0	990,000
British	R31-R32.	Short	1918	Rigid.	.....	21	615-0	.....	.....	65-6	1,550,000
British	R33-R34**	Vickers, Beardmore	1919	Rigid.	.....	23	670-0	92-0	.....	79-0	2,000,000
British	R38-R39.	A. W. & Co.	1919	Rigid.	.....	30	695-0	.....	.....	87-6	2,720,000
British	R80.	Vickers	1919	Rigid.	.....	20	530-0	85-0	.....	70-0	1,250,000
British	Vickers Commercial.	Vickers	1919	Rigid.	Passenger and Freight.	96	800-0	105-0	.....	100-0	3,500,000
French	Astra.	Astra Torres	1915	Non-rigid.	Submarine Scout.	6	295-0	.....	.....	54-0	495,000
French	Astra.	Astra Torres	1917	Non-rigid.	.....	.....	.....	.....	.....	.....	210,000
French	Astra.	Astra Torres	1917 (Late)	Non-rigid.	.....	.....	.....	.....	.....	.....	234,000
French	Capitaine Causin.	Capitaine Causin.	1917	Non-rigid.	Submarine Scout.	6	267-0	.....	46-0	.....	312,000
French	CM.	Chalais Meudon	1918	Non-rigid.	Submarine Scout.	5	.....	.....	.....	.....	176,500
French	Lorraine & Tunisie.	Lorraine & Tunisie	1916	Non-rigid.	.....	5	305-0	.....	5-0	.....	370,000
French	T.	.....	1917	Non-rigid.	Submarine Scout.	5	230-0	.....	46-0	.....	194,000
French	Zodiac.	D Arlandes & Champagne.	1915-6	Non-rigid.	Submarine Scout.	6	335-0	.....	.....	49-0	530,000
French	Zodiac.	Vedette.	1916	Non-rigid.	Submarine Scout.	.....	.....	.....	.....	.....	77,600
French	Zodiac.	Vedette.	1917	Non-rigid.	Submarine Scout.	.....	.....	.....	.....	.....	97,000
French	Zodiac.	Eclairer.	1917	Non-rigid.	Submarine Scout.	.....	.....	.....	.....	.....	219,000
French	Zodiac.	Croiseur.	1917-8	Non-rigid.	Submarine Scout.	.....	331-0	.....	50-0	.....	420,000
Italian	DE Dirigible Explorator	.....	.....	Semi-rigid.	Submarine Scout.	4	159-0	55-9	34-6	.....	92,000
Italian	F1.	Leonardo da Vinci.	.....	Semi-rigid.	Submarine Scout.	.....	132-0	.....	46-0	.....	115,250
Italian	F2.	Citta de Milano.	.....	Semi-rigid.	Submarine Scout.	.....	238-0	.....	59-5	.....	416,500
Italian	F3.	.....	.....	Semi-rigid.	Submarine Scout.	.....	297-0	.....	59-5	.....	487,000
Italian	F4.	.....	.....	Semi-rigid.	Submarine Scout.	.....	297-0	.....	59-5	.....	487,000
Italian	F5.	.....	.....	Semi-rigid.	Submarine Scout.	.....	295-0	.....	65-7	.....	628,000
Italian	F6.	.....	.....	Semi-rigid.	Submarine Scout.	.....	295-0	.....	65-7	.....	628,000
Italian	F8.	.....	.....	Semi-rigid.	Submarine Scout.	.....	361-0	.....	75-6	.....	990,000
Italian	M.	.....	.....	Semi-rigid.	Submarine Scout.	5	265-0	89-0	59-0	.....	441,000
Italian	V.	.....	.....	Semi-rigid.	Submarine Scout.	.....	287-0	.....	62-4	.....	553,000
Italian	P.	.....	.....	Semi-rigid.	Submarine Scout.	3	203-6	70-6	39-0	.....	176,500
Italian	P. Veloce	.....	.....	Semi-rigid.	Submarine Scout.	3	203-6	70-6	39-0	.....	176,500
Italian (Built)	British SR1.	.....	.....	Semi-rigid.	Submarine Scout.	.....	290-0	72-0	56-9	.....	450,000
German	L3 to L8.	Zeppelin.	1914-5	Rigid.	Bombing.	18	325-0	.....	.....	60-8 1/2	1,050,500
German	L11 to L19.	Zeppelin.	1915	Rigid.	Bombing.	18	561-0	.....	.....	60-8 1/2	1,130,000
German	L20 to L24.	Zeppelin.	1916	Rigid.	Bombing.	18	561-0	.....	.....	66-0	1,235,000
German	L30 to L39.	Zeppelin.	1916	Rigid.	Bombing.	22	643-0	.....	.....	78-9	2,000,000
German	L40 to L56.	Zeppelin.	1917	Rigid.	Bombing.	22	643-0	.....	.....	78-9	2,000,000
German	L57 to L65.	Zeppelin.	1918	Rigid.	Bombing.	22	693-0	.....	.....	79-0	2,200,000
German	L70.	Zeppelin.	1918	Rigid.	Bombing.	23	693-0	.....	.....	79-0	2,200,000
German	.....	Bodensee Zeppelin	1919	Rigid.	Commercial	.....	393-8	.....	.....	61-4	706,280

*Based on lift of hydrogen 0.068 lbs. cu. ft.

**R34 first airship to cross Atlantic

Estimated

Aviation Becoming Safer

DURING the war it had to be admitted that aviation was dangerous. The natural risks of flying were added to, and the risks of war were put on the top of that. Since the armistice it has been endeavored to prove that flying is safe, and this can only be accomplished by figures on properly organized public services, for it will obviously be a long time before the individual can be prevented from taking risks.

The time so far available to prove the reliability of the flying machine and the degree of safety of aerial navigation has been short, but here are some figures. From the beginning of May to the end of November of the present year regular commercial airplane services in France made 1079 individual trips, carrying 1356 passengers and 4518 parcels, and covering 274,757 miles. There was no accident of any kind during that period.

Between August 25 and November 1 the aerial mail

service between Paris and London made 147 trips out of the 154 on the schedule. One trip could not be made owing to bad weather and six were not completed owing either to the weather or to mechanical trouble. The planes covered 37,592 miles, and the average speed made was 104 miles an hour. This was an experimental period comprising a considerable amount of bad weather, and covering a district which is decidedly unfavorable for flying.

The Paris-London passenger service, on which Airco and Handley-Page machines are used, accomplished 322 trips from September 1 to December 1, 1919. The planes carried 624 passengers and 2876 parcels and covered a total distance of 78,031 miles. The average time for the Paris-London flight was 2 hours 25 minutes. During this period there were no accidents to persons. During the month of December when weather conditions were exceptionally bad, one machine crashed, killing the passenger

ships—1914 to 1920

by Arch. & Don R Black

No. of Engines	Make of Engines	Total H.P.	WEIGHTS					PERFORMANCE				
			Gross Lbs.	Empty Lbs.	Useful Lbs.	Useful per Cent Gross	Gross H.P.	Ceiling in Ft.	High Speed, M.P.H.	Range		
										M.P.H.	Hours	Miles
1	Curtiss-OXX2	100	*5,440	.....	.....	.....	*54.40	7,000	43.0	43.0	10.0	430
1	Hall-Scott A7A	100	5,275	.....	.....	.....	52.70	7,000	47.0	47.0	10.0	470
1	Curtiss-OXX3	100	5,275	.....	.....	.....	52.70	7,000	45.0	45-35	10-16	450-560
1	Curtiss-OXX3	100	*5,720	.....	.....	.....	*57.20	7,000	49.0	49.0	10.0	490
2	Hispano-Suiza or Union	250	12,700	7,940	4,760	37.50	50.80	8,600	60.0	55-45	28-47	1540-2150
2	Union	250	12,250	.....	.....	.....	49.00	8,000	60.0	60.0	12.0	720
1	Sturtevant	140	7,000	.....	.....	.....	50.00	.....	30.0	30.0	2.0	60
1	Thomas	150	*6,460	.....	.....	.....	*43.00	7,000	52.0	52.0	12.0	624
1	Un-on	125	*6,460	.....	.....	.....	*51.60	7,000	55.0	55.0	12.0	660
2	Sunbeam	300	11,065	7,481	3,584	32.50	36.80	.....	52.0	.....	.....	.....
2	Berliet-110; Fiat-260	370	14,470	10,438	4,032	27.90	39.10	.....	57.5	.....	.....	.....
1	Fiat	520	24,300	15,800	8,500	35.00	46.70	.....	57.5	.....	.....	.....
1	.....	80	4,750	2,950	1,800	39.70	59.40	.....	45.0	45-38	18-26	810-990
1	Rolls-Royce Hawk	75	4,928	4,189	739	15.00	65.60	.....	48.4	48.4	12.0	580
2	Rolls-Royce Hawk	150	6,990	4,750	2,240	32.00	46.60	.....	57.5	57.5	12.0	690
2	Wolsley Maybach	360	24,640	17,700	6,940	28.20	68.40	10,000	42.5	42.5-36-28	24-36-70	1020-1300-1960
1-2	Maybach-240; Maybach-180	600	53,700	42,100	11,600	21.70	89.50	.....	45.0	45-38-32	18-26-50	810-990-1600
4	Rolls-Royce	1000	60,500	46,400	14,100	23.30	60.50	.....	55.0	55-48-38	18-26-50	990-1250-1900
4	Rolls-Royce	1000	67,424	49,056	18,368	27.20	67.40	.....	55.0	.....	.....	.....
5	Rolls-Royce	1250	105,280	69,320	36,960	35.00	84.20	.....	70.0	.....	.....	.....
5	Sunbeam Maori	1250	134,400	67,200	67,200	50.00	107.20	.....	70.0	70.0	192.00	13,440
4-2	Sunbeam-350; Sunbeam-275	1950	173,680	101,680	72,000	41.50	89.20	.....	70.0	45.0	About 200	About 9000
4	Wolsley Maybach	880	81,760	48,160	33,600	41.10	93.00	.....	76.0	.....	.....	.....
6	600 H.P. Make not decided	3600	235,000	82,800	152,200	64.80	65.25	.....	75.0	60.0	80.0	4500
2	Chemu	440	35,808	21,248	14,560	40.06	81.50	.....	40.0	.....	80.0	.....
2	Renault	340	*14,300	.....	.....	.....	*42.60	.....	50.0	.....	10.0	.....
2	Hispano-Suiza	400	15,008	9,632	5,376	35.70	37.50	.....	50.0	.....	12.0	.....
2	Salmson Canton-Unné	480	20,608	9,552	11,056	53.60	43.00	.....	52.0	.....	.....	.....
2	Salmson Canton-Unné	320	11,648	7,616	4,032	34.60	36.40	.....	43.0	.....	12.0	.....
2	Clement Bayard	440	25,744	13,888	9,856	41.50	53.80	.....	50.0	.....	.....	.....
2	Salmson Canton-Unné	320	12,096	8,288	3,808	31.50	37.80	.....	43.0	.....	.....	.....
2	Zodiac	440	34,048	18,368	15,680	46.00	77.40	.....	43.0	.....	.....	.....
2	Anzani	140	4,995	.....	.....	.....	35.70	.....	About 50	.....	.....	.....
2	Renault	120	6,272	.....	.....	.....	52.20	.....	About 50	.....	.....	.....
2	Hispano-Suiza	440	14,112	.....	.....	.....	32.10	.....	About 50	.....	.....	.....
2	Zodiac	450	29,792	.....	.....	.....	66.00	.....	47.0	.....	.....	.....
1	Fiat	100	6,272	.....	.....	.....	62.70	.....	42.5	.....	.....	.....
1	Antoinette	40	7,437	.....	.....	.....	186.00	.....	31.0	.....	.....	.....
1	I-P	170	26,880	.....	.....	.....	158.00	.....	40.0	.....	.....	.....
4	Fiat	400	31,360	.....	.....	.....	78.30	.....	46.0	.....	.....	.....
2	Fiat	320	31,360	.....	.....	.....	98.00	.....	45.0	.....	.....	.....
2	Fiat	480	42,784	21,392	21,392	40.80	89.20	.....	43.5	.....	.....	.....
4	Fiat	960	42,784	21,828	20,956	40.00	44.60	.....	45.8	.....	.....	.....
4	Fiat	1400	67,200	33,511	33,689	50.30	48.00	.....	49.7	.....	.....	.....
2	Italia	560	30,912	.....	.....	.....	55.20	.....	.....	.....	.....	.....
4	Italia	520	38,080	.....	.....	.....	73.20	.....	51.0	.....	.....	.....
2	Fiat	150	12,096	.....	.....	.....	80.60	.....	40.0	.....	.....	.....
2	Fiat	450	12,096	.....	.....	.....	26.80	.....	56.0	.....	.....	.....
2	Maybach	400	*30,600	*22,900	7,700	*25.20	*76.50	.....	40.5	.....	.....	.....
3-1	Maybach-180; Maybach-240	780	71,680	.....	.....	.....	91.80	9,000	50.0	50 Cruising	14-26	700
4	Maybach	880	76,832	41,664	35,168	45.80	87.30	10,000	55.0	55 Cruising	25-60	1375
5	Maybach	1100	90,048	.....	.....	.....	81.80	11,500	59.0	59 Cruising	30-67	1770
6	Maybach	1320	133,280	72,800	60,480	45.30	100.60	14,000	60.0	60 Cruising	54-110	3240
5	Maybach	1200	133,280	64,960	68,320	51.20	101.10	21,000	62.0	62 Cruising	46.3-92.5	2675
5	Maybach	1500	148,736	.....	.....	.....	99.20	22,000	76.50	65 Cruising	65-150	4225
7	Maybach	2100	148,736	61,804	86,932	58.30	70.80	20,900	77.6	77.6 Cruising	55-177	4270
4	Maybach	1040	50,700	28,700	22,000	43.30	48.80	.....	80.7	80.7	11.5	890

and the pilot. This is the only fatal accident to date on civilian air lines running from France.

Owing to the impossibility of reaching the devastated areas in reasonable time, the postal department inaugurated an air mail service between Paris and Lille. From May 1 to October 25 the planes made 328 journeys, covering 46,875 miles, carrying 827 parcels, 1800 bags of mail, and 13,700 telegrams. The average time for the journey was 1 hr. and 30 min.

Another public service was from Toulouse to Rabat, in North Africa. This route passes through Barcelona and Malaga and is 1087 miles in length. From September 1 to December 1 the operating company made 48 distinct journeys, covering a distance of 52,344 miles, carrying 19 parcels, 73 sacks of mail, and 33 passengers. The average time for each journey was 40 hr.

At the present time France possesses 61 civilian landing grounds for which a government department is responsible. Of these 14 are landing grounds only, without sheds

or supplies; 20 more are specially prepared landing grounds with sheds, but without attendants. Among these is Ciry Field, the big receiving station of the American Air Service during the war. There are 20 military landing grounds completely fitted up with sheds, repair shops, supplies, and skilled attendants. Five grounds are specially reserved for the Navy, and two have airship facilities.

For the year 1920 it is proposed to vote \$46,678,600 for civil aviation in France. This amount will be distributed among three different branches of civilian aviation: Navigation, technical and manufacturing. The amounts to be expended on salaries will be \$1,148,784 for navigation; \$178,020 for technical, and \$341,340 for manufacturing. Operating expenses for these services will be \$4,709,920 for navigation, \$9,231,000 for technical, and \$400,000 for manufacturing. For the construction of new material there will be spent \$12,670,000 for lighter than air machines; \$12,494,000 for airplanes, \$3,200,000 for competitions, and \$966,000 for technical work.

Developing Laboratory Work Along Practical Business Lines

A scientific research department kept in close touch with actual production methods and business plans is a real asset to a manufacturing concern. One firm has worked out an excellent organization plan to meet this need for inter-relationship

By J. Edward Schipper

WHEN an industrial plant is bold enough to part from traditions in organization, it is a more important matter than a mere departure in practice. This organization departure is likely to be the originator of a great many departures in practices.

In building the Research Department of the Aluminum Castings Company, that organization made a radical departure from tradition in two ways. They put at the head of the Research Department a man of wide business training with a large knowledge and keen sympathy for scientific development. This man was also made a member of the Future Markets Committee of the company. In other words, the company recognized the fact that research work is valuable only as it affects the future market for the products which the organization is able to turn out, and further, that the executive work in connection with research, developing an organization and keeping it inspired is not a technical matter but a human matter, for which the man should be chosen because of his wide training and keen sympathies rather than his technical knowledge and scientific experience.

The matter goes much further, however, than the appointment of such a man at the head of affairs; that is merely an indication of the vision which lies behind the whole scheme. For some reason in most Research Departments and in more of the organizations of which they are a part, impressions seem to prevail that there is a definite line beyond which the research type of mind becomes entirely valueless and at which point the research development must be taken over by the commercial man in order to bring it to effectiveness in connection with the market. So it happens that the research man is allowed to wander off on his theoretical investigations without any particular understanding of their value to the organization, and the commercial development men are frequently convinced research is largely impractical and of doubtful value. The Aluminum Castings Company have eliminated all this; they have not merely co-ordinated the departments, but they have arranged the organization so that it is running as an integral function of the whole company with its own responsibilities to the company's ultimate purpose well in mind.

The Possibilities

This makes it possible for the Lynite Laboratories to be much further ahead of the production and marketing departments in their investigations and their determinations, and consequently to be of much more value to the company. The possibility of developing hardness, toughness, and other qualities in an aluminum alloy, which had

not been found previously in the same combination, suggests to the Future Markets Committee opportunities for the sale of aluminum alloys which could not come within the scope of practicality until the material itself was discovered. The chief executive of the laboratories being a member of the Future Markets Committee is able to take immediate advantage of the scientific research conducted in the department, and begin work on the applications of that research through the future possibility of sales.

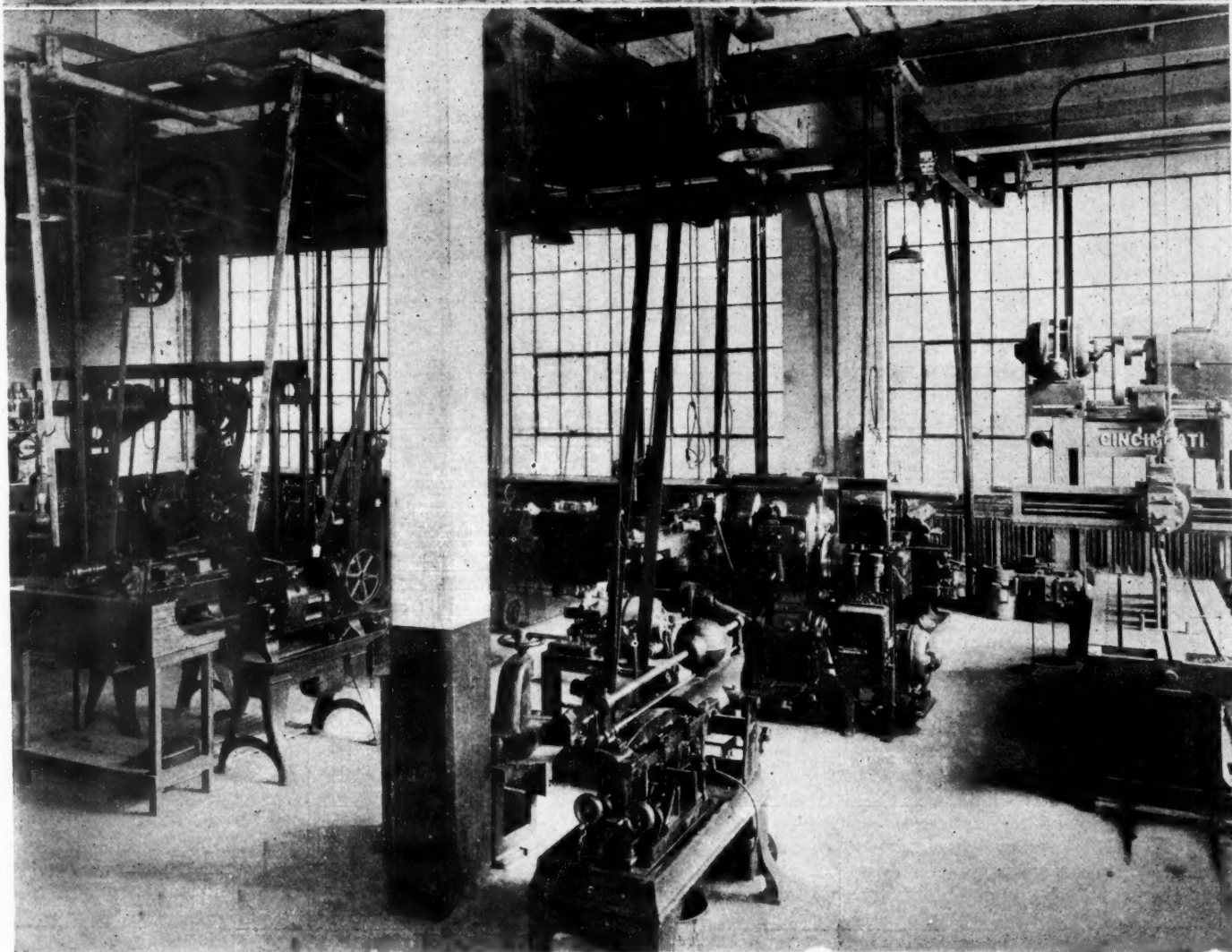
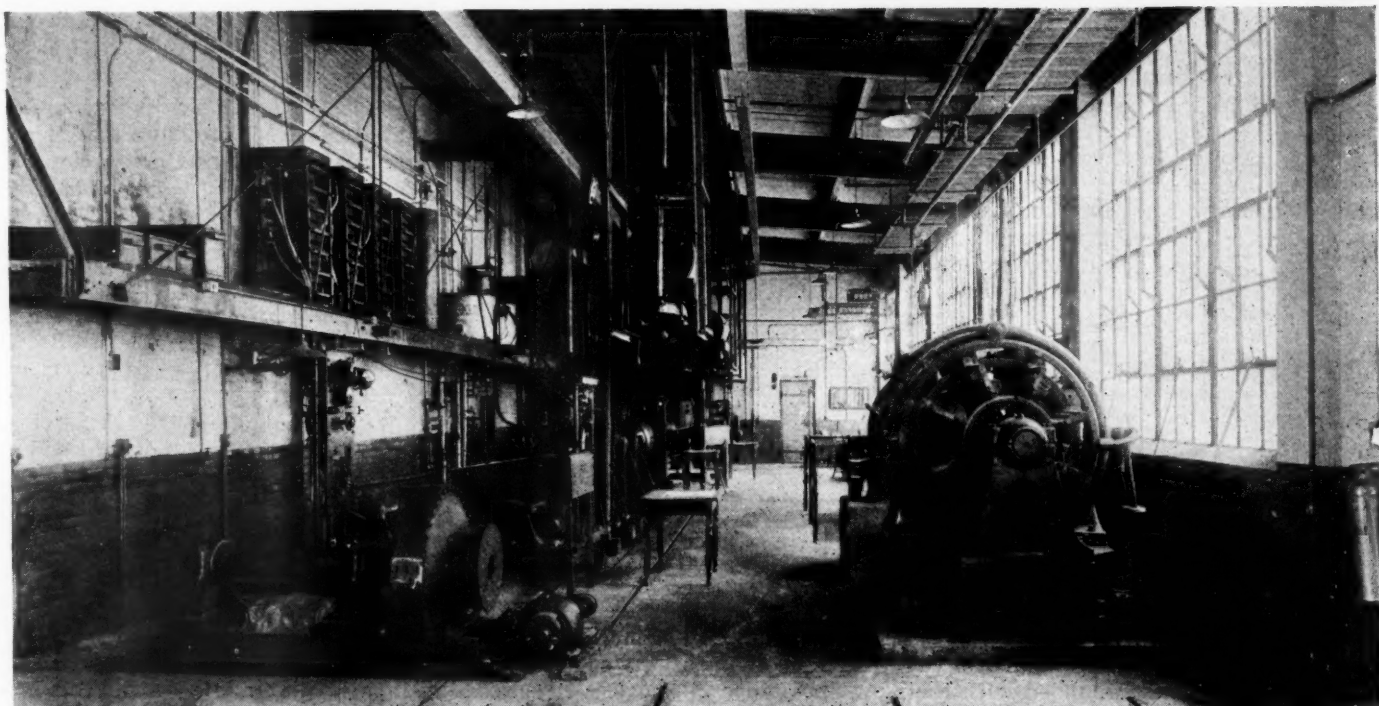
Where the Research Department is conducted entirely by scientists and technical men, each new discovery immediately opens up a suggested use, or arises from an attempt to meet a suggested need, and the further inspiration is unconsciously directed toward the final application to that end. Between the original discovery and the final application there is lost to the organization the possibilities of development for practical uses which were not thought of in the original attempt and which had no place in the research idea.

In the Lynite Laboratories the character of the organization makes it possible for the company to get the full value from all discoveries which are made, and pursue these possibilities so that all practical applications are worked instead of only the one which started the matter.

The Consultant Committee who work with the manager of the Lynite Laboratories are members of all branches of the firm and their vision of the business is brought to bear on every development. Furthermore, the various departments of the Laboratories are brought together regularly through the meetings of their executive heads. This does not mean simply co-ordination but it means an understanding of the necessities and purposes of the company filtered down through each of the branches of the Research Department so that every mind is alert in response to the necessities and devoted keenly to the outcome.

The general organization plan which follows is of great interest, but the fundamental change lies in the consolidation of the Lynite Laboratories into an integral part of the company so that the spirit of research and the purposes of the company become one in the minds of those engaged upon the work.

The Aluminum Castings Co., under the trade name, Lynite and Lynux, has developed and is developing a range of aluminum alloys which are now accomplishing results far beyond what were originally thought to be the limitations of aluminum. Future developments of the most valuable kind are also anticipated at an early date as a direct result of the work of the Lynite Laboratories. The high degree of organization of the laboratories is responsible for the close connection between the highly scientific



*The dynamics laboratory with 100, 200 and 400-hp. dynamometers and the requisite auxiliary department.
Special toolroom for the general engineering and automotive engineering section, where experimental and development machine work is carried out*

work of this department with the other activities of the business.

The Organization

The general organization of Lynite Laboratories is laid out on broad and comprehensive lines. It includes the following three divisions: 1—Research along purely scientific lines in the arts of alloying and fabricating non-ferrous metals. 2—The adaptation of this scientific knowledge by means of experimental and development methods. 3—The scientific control of foundry and manufacturing practice to insure the desired results.

The importance attached to the research and development work by the company is significant from the fact that starting in 1915 with a single scientist and a works laboratory of one room in an office building, Lynite Laboratories today maintains a staff of over 100 trained specialists, and occupies 20,000 sq. ft. of floor space in a building erected entirely for the purpose. It is equipped with modern apparatus of wide range for research and experimental work and also directs the activities of the commercial testing and control laboratories in the company's various plants.

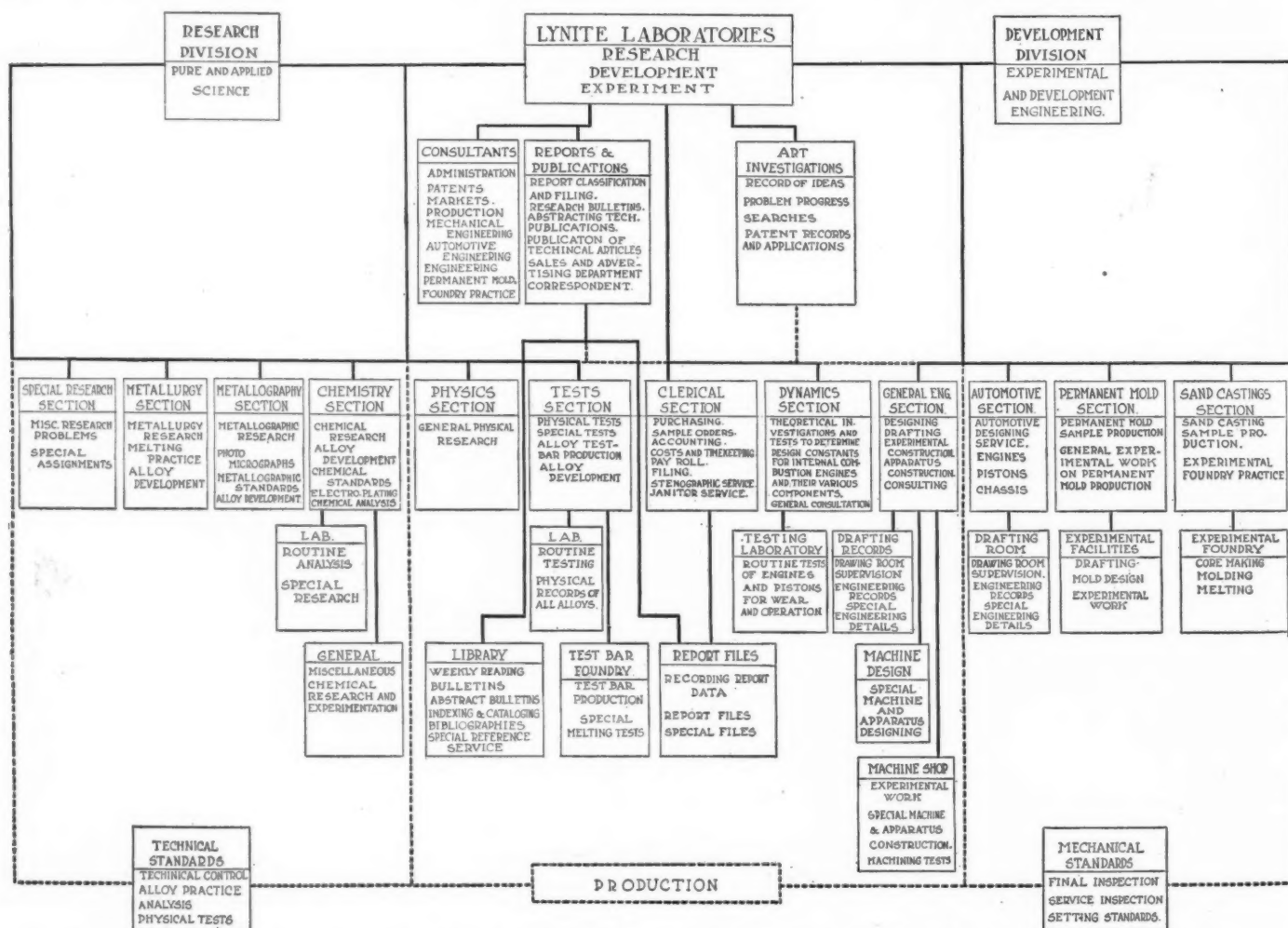
Open mindedness is the cardinal principle of laboratory work and this state is maintained by the entire organization. The laboratory workers are all young men who have not had time to be surrounded with their own prejudices. They are not locked within their own walls and ideas are freely exchanged. Every member of the organization is impressed with the fact that ideas control markets, and

that the company's future depends upon its keeping in advance of the present development of each art or science with which it is concerned. It is of primary importance that the organization be as free as possible and that each member be free to express his ideas having to do with his particular work, and at appropriate times to express all his ideas with respect to the operation, development and organization of the Laboratories. These ideas are collected, sorted and classified and form a part of the records of the organization.

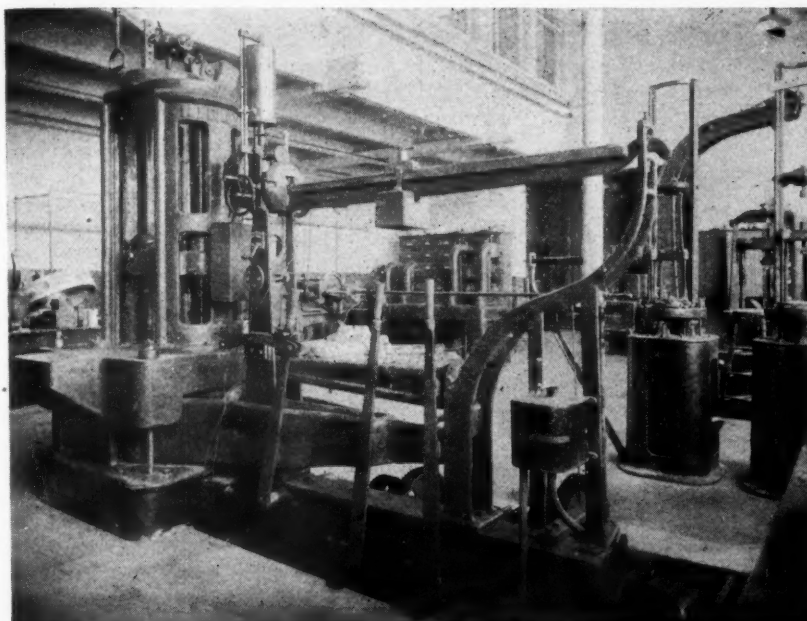
Creating a Problem

For an idea to receive the attention of the Lynite Laboratories staff it must become a formal problem. Before it can become a formal problem, it must pass the critical scrutiny of a Problem Committee, which includes the heads of various sections of the Laboratories, as well as executives of the company itself.

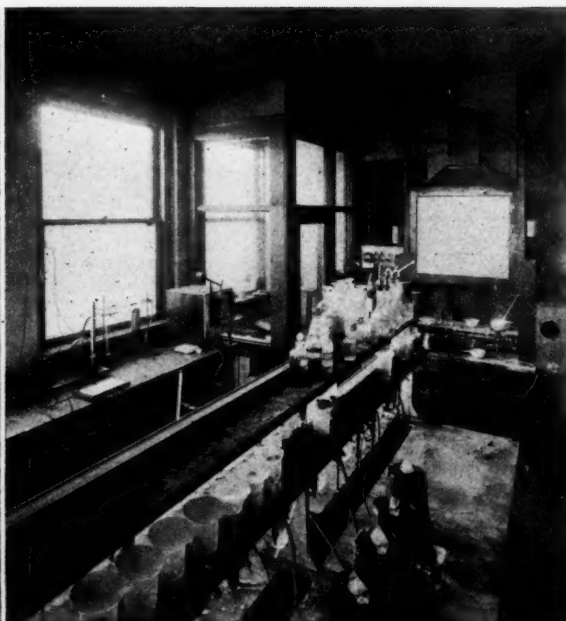
When the idea has passed this first acid test and becomes a formal problem, it is necessary to determine its status, for nothing must be done that has already been done. Accordingly, all existing information bearing on the problem in any way, whether in the files of the Patent Office, in technical publications, in text books, or in the minds of men, is systematically collected, classified and carefully studied. When this has been done, the problem is labeled either "urgent," "important," or "common," as the necessity of the occasion dictates, and assigned to its particular section or sections of the Laboratories. From this point it is carried along with the speed consistent with



Organization chart of the Lynite Laboratories, showing the interdependence and correlation of the various sections. Names have been omitted from this chart for obvious reasons; the names of the departments and their sub-divisions, however, have been retained



A section of the physical testing laboratory, with a tensile machine having a capacity of 200,000 per sq. in. in foreground



The chemical laboratory for analysis and research

its classification until the day when the problem is voted "closed."

Upon the problems which constitute the working program of the Laboratories, the energy and talent of the various sections is concentrated. Progress reports on the work accomplished are written at periodic intervals and these are numbered consecutively. As frequently more than one section is concerned with an investigation, the Progress Reports only reflect the true and proper conclusion when taken collectively. Accordingly, at extended intervals, a Master Report is written which correlates and combines the data contained in the Progress Report. The Master Report omits details. It is concerned with results. It is the record of success or failure of the work undertaken. From the Master Report the Problem History is compiled, which includes the actual financial cost of the problem.

Preserving Reports

All reports on problems whether Master or Progress Reports, are prepared in accordance with a standard form, and are suitably bound and labeled. Four copies of a report are regularly made, including (1) the original or report file copy, from which blueprints may be taken; (2) the problem file copy; (3) the addressee file copy; (4) the writer's file copy. These four copies, as well as any extra copies, are sent to one central point, known as the Reports and Publications Section, where they are received, recorded and then properly distributed.

In order that every section may enjoy full knowledge of the work carried on by every other section, all reports written during the week are included in the Weekly Reading Bulletin, which is prepared and circulated by the library connected with the Reports and Publications Section. The title of the report, its object and writer, are included and thus it is possible for everyone to be entirely familiar with the various phases of the work undertaken whenever and wherever these are accomplished.

In addition to the report, there is a Weekly Reading Bulletin. This bulletin is circulated among the staff of the Laboratories and is a digest of the important scientific articles appearing in the current technical journals published in this country and Europe. From these Weekly

Bulletins a special printed Abstract Bulletin is later made up, which is intended to be an index to all sources of information of value to the Aluminum Castings industry. The Reports and Publications Section also encourages the preparation of technical articles by the Laboratories staff for publication in the trade journals.

Division of Laboratories

The organization of the Laboratories consists of two main divisions which are sub-divided into sections. The titles of these and their inter-connection are better shown graphically than it is possible to explain them and they are illustrated on the chart herewith. The Division of Research embraces all investigations in the realm of pure science. The Metallurgical Section includes all the metallurgical research not included in the special research field. It consists generally in a study of alloy development and particularly in the investigation of melting practice and improved metallurgical methods.

The chemical section has two distinct phases, namely: test and research. The exact control necessary to successful operation and research is rendered possible by the chemical testing laboratory. Here is the personnel and equipment necessary for the complete analysis of aluminum alloys, bronzes and other metals. The research activities of the chemical laboratory include special experimental and development work. This laboratory is really the connecting link between the test tube and beaker to plant production. It includes a work shop equipped with motor tools and specially constructed apparatus designed to meet the needs of industrial research work.

In the metallography laboratory the constitution and structure of metals and their alloys are studied. The metallographic properties thus determined are correlated with the physical and mechanical properties. The laboratory is equipped with the usual apparatus for metallographic investigations, including photomicrography and thermal analysis.

The physics laboratory exists for the study of the physical phenomena relating to the company's processes and products. As an illustration, the lubrication of bearings is being studied from a theoretical and experimental standpoint. This section is also engaged in important



A corner of the metallographic laboratory

expansion and thermal conductivity investigations. Special apparatus has been designed and built which enables measurements of these quantities to be made at high temperatures almost to the melting points of the alloys. Precision apparatus is also available for making standard determinations, such as electrical conductivity.

The test includes a test bar foundry and a physical testing laboratory. The work of the foundry consists in the production of test bars, by which the physical properties of the alloys are studied. Here is where the new alloy mixtures are made up and various heat treatments tried out. The work of the physical testing laboratory is both routine and special, according to the nature of the problem with which it is concerned. Under routine tests would be classed the usual tension tests, by which the yield point is determined as well as the maximum stress and elongation. The apparatus includes machines which will take a standard test bar of a material having a maximum stress of as high as 200,000 lbs. per sq. in. The laboratory is equipped for single and repeated blow impact tests as well as alternating stress tests. Apparatus for the usual Brinell and scleroscope hardness tests is also provided.

The dynamics laboratory is of particular interest in the automotive field. It occupies a room about 110 ft. long by 25 ft. wide. Its work consists of theoretical investigations of internal combustion engines, and in particular, study of such parts as use aluminum alloys. Tests on the use of aluminum for various parts of the engine where other materials are at present used forms a very important part of the work of this division.

It is largely through the work of this division that proper methods of designing aluminum pistons have been discovered. Previously, aluminum pistons were made in the same manner as iron pistons and unsatisfactory results were obtained, due to the fact that the piston was not designed in accordance with the inherent characteristics of the metal. Present successful piston types are particularly designed with due consideration given to the

material employed. The laboratory has a complete dynamometer equipment and all the necessary apparatus for taking fuel, water, air and other measurements. In the dynamics laboratory, gears, rear axles, etc., are also included in the test work and for this reason an Alden absorption dynamometer is included.

The general engineering and automotive engineering sections of the laboratory work are closely related. Development work requires a particular outfit of machinery and tools, having the minute accuracy of the specialized tool room and at the same time the range and adaptability of the contract shop. Accordingly, the general engineering section is provided with a full line of tools and machinery to meet these extraordinary demands. Its work calls for the building of special apparatus and machinery for experimental purposes and the machining of specimen bars for various tests. The shop also takes care of the repairs for all apparatus of the laboratories which require machine work. It has its own drafting and designing corps and keeps its own special drafting records and files.

A special staff takes care of the automotive development work with men who follow the theoretical principles of design involved in the evolution of the automobile. It further includes experts in the various branches of automotive design, particularly on motor car and aerial engines. It is further specialized to include experts on the various parts of these engines, such as the piston, cylinder and other parts that may be made of aluminum alloys or involve the use of them. This section of the laboratory is of course of interest to the automotive field, as it may be utilized in a consulting capacity in relation to the design of parts which may include aluminum alloys.

The permanent mold and sand casting sections may be classified as progress sections, each concerned with experimentation and development work in a particularly assigned field. It is from here that the new products or processes go into production.

Russia as a Prospective Buyer of Automotive Products

With the lifting of the Russian blockade by the Allies, a vigorous interest in Russian trade prospects has sprung up in this country. Automotive equipment is needed in the task of developing Russia's vast natural resources. This article is written by a Russian who was thoroughly familiar with the automotive industry in Russia prior to the revolution

By Nicholas G. Kousnetzoff

THE Russian market for automobiles, motor trucks, tractors, and motorcycles is a large one, capable of development by American manufacturers. There are many local conditions, however, which must be thoroughly understood if American effort in this direction is to be successful. These conditions do not relate particularly to the present unsettled state of the country, but to certain permanent, fundamental factors which have always been present in the past and probably will continue in the future.

Transportation Systems—Railroads

To begin with the proportion of railroad facilities in Russia as compared with the area is of importance. In the United States, which is covered by an elaborate network of railroads and which has over seven million motor cars, it is difficult to picture an enormously large country with a population twice as great, living almost without motor cars and with a comparatively insignificant railroad mileage. This is, however, the condition in Russia.

Russia, with an area of 8,400,000 square miles, covers about one-sixth of the entire surface of the earth, while her railroads extend only about 46,000 miles, one-tenth of the railroad mileage of the United States. Even this grossly insufficient transportation system of Russia never operates at its full capacity; the entire system lacks adequate organization.

When the Russian railroads were built, the builders concentrated their attention almost entirely upon the principal trunk lines. These lines were constructed to connect only the important centers, while the secondary lines were practically neglected. In several cases, moreover, the railway station was purposely built several miles from the city, with the idea that the city should be artificially built up to grow out to the station.

As a result several of the railway lines crossing the richest lands in Russia work at a deficit, simply because of the difficulty of transporting goods to the railway.

The ultimate and obvious remedy for this situation is, of course, the construction of a number of freight railway lines by which the farmers can ship their goods to the trunk lines and thence to the great distributing centers. The Russian government realizes this fact and strongly desires to push such railway construction. The state of disorder in which the country now is, however, eliminates the possibility of these developments for some time to come.

The reconstruction, reorganization, and enlargement of the Russian railway systems cannot be accomplished overnight; it will take many years of hard work. In the meantime some method of meeting these transportation

difficulties must be found if the country is to gain national prosperity.

It is evident that the best solution to this pressing transportation problem is the extensive use of motor trucks. These trucks can not only be used to transport goods to the railways, but can also be adapted to use over the railway tracks. This latter use has been a demonstrated possibility for some time and would go far toward relieving the terrific shortage of railroad engines. There is not only a scarcity of railroad engines, but a greater scarcity of engines that run.

The chief service of the trucks, however, will be in transporting goods from distant points to the trunk lines of the railway system. The first problem arising in this connection is the condition of the roads. Long ago, before railroads existed in Russia, excellent macadam roads were built in many parts of Russia, but the enormous size of the country and the scattered nature of the population made it impossible to construct roads as numerous or as perfect as the *chausses* of France and England. Since the construction of the railroads, moreover, macadam and other road construction has been grossly neglected.

Like the railroads, however, there are several main trunk roads which are in excellent condition and suitable for trucks and cars. In European Russia there are now about 25,000 miles of improved roads, connecting the largest cities only, without branches.

Outside of these main roads, however, there is little but dirt roads, which are much less suitable for the truck and motor car. Some of the most important roads connecting Petrograd and other large cities were built by Catherine the Great: the Petrograd-Reval road, for instance, is now without any trace of macadam, not having been repaired for nearly a century.

Trucks a Great Need, but Roads a Serious Problem

Thus, although the roads in some places are good enough for use at the present time, the larger part of them are in such poor shape that almost complete reconstruction is necessary. To meet the immediate needs in such cases, special tracks can be built on a plain dirt road. These tracks are made from stones, concrete, iron bars, bricks, or even wood, while the space between them remains plain dirt or clay as the case may be. This type of road is very inexpensive and can be built with great rapidity. Thus traffic would be allowed to start almost immediately. Roads of this kind were successfully constructed and used in Russia during the war on several occasions, while they were extensively used by the Germans.

Taken as a whole, the extensive dirt roads of Russia

probably offer much less difficulty in so far as truck operation is concerned than do the oil fields of the United States. The erroneous opinion of the American public is that Russia has practically no roads at all. Russia has, in the aggregate, over 400,000 miles of roads, mostly dirt, as noted above. These roads are suitable for truck transportation during the dry season, although they become almost impassable during the winter.

The motor truck is Russia's great need in the automotive field. Her potential capacity as a market for this type of motor vehicle is almost limitless, so that the study of methods of developing this large market is worth any time and money which may be expended in it.

The Passenger Car Opportunity

Since the extensive use of passenger cars depends upon good roads even more than does the use of trucks, this factor assumes an additional importance when the possibilities of the Russian car market are discussed.

For various reasons roads are more numerous in Crimea and the Caucasus. In Crimea the roads were built because the Emperor and all his relatives had their country palaces there, while in the Caucasus, the high mountains rendered railroad construction too expensive.

These few good roads prove, however, that if desired, the roads of Russia can be made as good as in any other country and certainly with the development of automobile ownership we would see new roads built and the old ones improved as quickly as in the United States. Russian "chaussees" as the natives call them, are not exceptionally bad. This is proved by the fact that the very high speed has been obtained on the ordinary Russian roads. During the races and great reliability trials a speed over 100 miles was attained (Russian record—156 versts); and over a distance of 400 miles the average speed of winner was nearly 70 miles per hour. (The Petrograd-Riga race in 1909 and the Great Russian Circuit 1913).

Even with the roads as they are at present, touring in Russia is quite pleasant. The main roads extend nearly all over the country, and there is little chance of the tourist losing his way; for there is usually but one macadam road, while the adjoining dirt roads are nearly always in such poor condition as to be impracticable for the pleasure-seeking motorist. Most regions, moreover, are so sparsely settled that a far greater average speed can be attained than in England or France. As good roads are related to motor cars, Russia has the same "vicious cycle" that appears in other comparatively undeveloped countries; motor cars are scarce because the roads are poor and roads are poor because motor cars are scarce.

The Rise of the Automobile

The great impetus to automobiling in Russia was given by the reliability trials organized by the Russian Auto Club, especially those called "The Cup of Czar," which was disputed three consecutive years.

The first trial was in 1909, from Petrograd to Riga and back, a non-stop race for over 700 miles; more than 30 cars were entered, most of which were driven by amateurs. It was a great success and the next year, 1910, was the first "Cup of Czar," which attracted more than 70 cars; this time the professional people came to Russia, mostly Germans who saw the best opportunity to show their motor cars to the public on the roads and to prove the capacity of their cars to run over Russian roads faster than the best train.

The trial was from Petrograd to Kiev and Moscow and back to Petrograd, about 200 miles.

The German cars took all the best places and won the Russian market for scores of years.

The 1911 trial was a long one—from Petrograd to

Crimea—across all Russia, through Moscow, Kursk and Kharkoff. This trial was particularly interesting because from Kharkoff southward there were no more improved roads and the motor cars for the first time ran on the dirt roads. This race was a distinct advance in the history of Russian automobiling and it was immediately followed by the race on the Caucasian coast, from Novorossisk to Gagry.

In the same year was the first Russian military trial for trucks; from Petrograd to Moscow and back, nearly 800 miles. This was the beginning of the Russian military automobile department.

Next year came the second military trial for touring cars on the worst possible roads specially chosen to prove whether or not motor cars were able to run practically everywhere in Russia.

All motor cars numbering about 60, finished the trial, but some of them spent 18 hours to make 20 miles. The same year the "Cup of Czar" was contested for the third and last time. The course was half over improved and half over plain dirt roads, the trip was very long and difficult. Those trials did more to develop the popularity of the automobile in Russia than years of waiting could have done. In the beginning the public was sceptical and even hostile and scoffing, but the capacity of motor cars was shown so clearly by these trials that public opinion was radically changed and the progress of the automobile trade was insured for years.

Sources of Automobile Supply

Once the automobile trade became a distinct factor in the development of Russian commerce, competition naturally arose for command of the market. The domestic manufacturer of automobiles in Russia has in the past been almost negligible. The entire output before the war consisted of about 500 cars a year, manufactured by a single firm in Riga.

In 1916, however, the government of the Czar decided to go into automobile production on a larger scale, and took over five factories for that purpose. The object was to build up for Russia an automobile industry of her own. On the eve of the revolution these five factories were practically ready to begin the production of motor cars. Since the revolution, however, it is probable that no steps have been taken in the further development of this enterprise. It is likely, nevertheless, that some action will be forthcoming in the near future. It is estimated that these factories will produce between 7000 and 8000 motor cars yearly. Even this production, however, will not nearly meet the constantly growing demands of the Russian market.

German Cars Most Used

With Russian production a negligible quantity, German cars dominate the market. This is true for several reasons. First, because the German salesmen were near at hand, saw the opportunity, and came to Russia in great numbers. Secondly, the German cars were good cars, and were sold at a relatively cheaper rate than those of any other country. Finally, the German salesman studied and knew Russia and her people better than did the representatives of any other country; he put more good will and tenacity in his business.

German salesmen came to Russian purchasers with far better propositions than did the others; and they did everything possible to hold the market as long as they could. French and English agents neglected their business, feeling that their products were far superior to those of the Germans; they waited for customers to come to them. The Germans went to prospective customers and persuaded them to try the German cars. Until the outbreak of the

war, Germany held this supremacy in the Russian automobile market, and the most popular cars in Russia were the *Mercedes, Benz, Opel*, etc.

French Take Second Place

The second place belonged to the French, who were the first to sell motor cars but lost their place quickly owing to their insufficient attention to business. Next came the English, Italians, and Belgians in the order named. American cars came last in number and were but very few.

American Cars at Foot of List

Although many firms have had their representatives in Russia, as, for instance, Packard, Peerless, Locomobile, Dodge, Pierce-Arrow, Oldsmobile, Mitchell, and many others, they sold but very few cars and were practically unknown to the general public.

The best represented car was the Ford and its exceptionally able dealer sold more cars than all the others put together. Hupmobile, Studebaker, Kissel, Saxon, Metz, Singer, Marmon, Chalmers, National, Reo, Case, Regal, Detroit and some others were also represented in Russia, but none of them did much business in this great market.

Since the outbreak of the war, however, more than 25,000 motor cars have been imported into Russia, and over 85 per cent of them from the United States; consequently the American motor cars are far better known in Russia to-day than they were in 1914.

The Russian Tractor Market

Russia being an agricultural country presents a rich and attractive market for all kinds of agricultural machinery and especially for tractors.

War and famine during the long unrest have taken away the largest number of horses and the tractor will be among the first necessities of new Russian life. They should be sold by tens of thousands.

American agricultural machinery and tractors are well known in Russia already and have a high reputation as the most reliable, the most simple to handle, and the most adaptable to Russian conditions.

During the war, in spite of conditions, the Russian Department of Agriculture bought about 350 American tractors for experimental purposes in Russian service. These trials were entirely satisfactory and proved that American tractors are the best and the most suitable for Russia. The greatest demand will be for the small stationary motors suitable for small work-shops and to do all the petty jobs in the life of Russian workingmen-peasants, who are working outside of the factories for themselves.

The Department of Agriculture estimates the number of those motors needed for Russia as high as 500,000.

Accessories and Gasoline

In Russia there were two factories making auto tires, "Provodnik" and "Treugolnik"; both produce a very high grade of tires which not only in Russia but in the foreign markets were highly appreciated and sold in great quantities. Both firms are represented in the United States and do a good business.

Russia holds the second place in the world's production of petroleum and gasoline; America stands first. The pre-war prices were comparatively low, the gasoline about 20c per gallon, and kerosene about 15 to 20c per gallon.

No filling station existed in Russia and in this line an extensive field lies open for energetic people and for large companies selling the full equipment for such stations, which undoubtedly will be in great demand as soon as the auto trade with Russia is resumed.

Freight and passenger service by motor cars began to develop itself in Russia only in the last few years. Where

the condition of roads allowed the regular service was organized, namely, in Poland, in the Caucasus and in Crimea where were no railroads.

Not only in Russia proper but even across the border to Teheran, in Persia, autobuses were running and their service was quite satisfactory. In several cities despite very poor street paving autobuses were operating regularly.

Motors

As to motors for boats, etc., there were before the war only the Buffalo, Mietz & Weiss, Scripps, Monarch and Standard Wolverine, and very few of them.

A large number of motors for propelling boats on Russian rivers and along the sea shores will be needed from the smallest to the largest—up to 200-300 hp. On the Volga river several large boats were, even before the war, already propelled by Diesel motors and the future opens a good market for all internal combustion engines.

Russian Market for American Products

The organization of domestic Russian production of motor cars will require a very long time and probably for many years will not be sufficient for the needs of the country. Therefore, it should be profitable for American firms to build at once factories for assembling the automobiles from the parts brought from America and to begin to make in Russia the simplest and heaviest parts; and thus little by little, become able to produce automobiles and tractors made entirely in Russia. Several such factories could probably be opened at the same time and work successfully, since orders will for a long time surpass the capacity of these plants.

Russia's resources are still very great and her paying ability should soon surpass those of all European countries. Her gold reserve is now greater than that of any other country and her natural richness is inestimable.

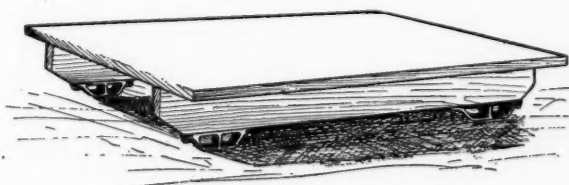
The raw material already amassed by the Russian government presents an incalculable fortune, which since the blockade has been lifted will probably be sent abroad as payment for the goods and products Russia needs for herself.

The Russian automobile market will be soon opened and it is the greatest and richest market of the world.

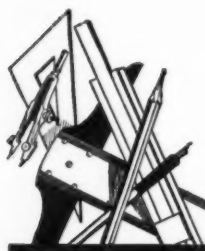
American automotive industry should come to Russia among the first and take the place which belongs to it; the market is too important a one to neglect.

Metal Feet for Transveyor Platforms

THE Cowan Truck Co. has put on the market cast-iron feet for platforms used in connection with the transveyor or elevating type of hand trucks. The commonest form of platform or skid is made of wood, and the feet of these skids are very liable to wear, which in a short time reduces the height of the platform so that the trucks will not run under them. These metal feet are bolted to the skid, as shown in the illustration, and take all of the wear, and they are said to more than double the life of the platform.



Metal feet for transveyor skids



The FORUM



What F. O. B. Means

Editor AUTOMOTIVE INDUSTRIES:

WE were very interested in reading your outspoken article under the above heading in your issue of October 9.

The term "f.o.b." in Europe has always meant free on board a steamer. British firms almost invariably quote f.o.b. some particular port, and this means the price for such goods placed on board a steamer at that port. We think we are right in saying that this term "f.o.b." is understood all over the world as a price for goods placed on board a vessel, whereas in the United States it may mean, as it often does, free on board a railway car at some inland town.

Undoubtedly, many firms in distant countries, when they receive a quotation from a New York firm for goods "f.o.b. New York," are led to believe that the goods are placed on board a steamer in New York harbor. In our own New York office we are always most careful to use the full wording "free on board steamer," not f.o.b., or if we quote for delivery from some inland town we state "Ex Factory" at such and such a place. These terms leave no doubt as to their meaning and we would respectfully suggest that if other American firms would quote in this way much misunderstanding would be avoided. No doubt the publicity you have given to the matter will assist very materially.

Yours very truly,

A. S. MORRIS,
Managing Director

For Morris, Russell (1919), Limited.

Loads on Rear Axle Housings

Editor AUTOMOTIVE INDUSTRIES:

WE read with much interest your reference to the "Fergus" car in your article on "Mechanical Tendencies Revealed at the Grand Central Palace" in the issue of Jan. 8, and would like to make a few remarks on the following sentence:

"If the spring is outside the frame—assuming the latter to be of a given weight—the load on the rear axle comes very close to the wheel, and the bending moment on the axle is consequently reduced."

This is a point that the writer, as chief designed of the "Fergus," has kept before him for many years, and, all other things being equal, it is, of course, correct.

We have found out, however, under the most severe road testing, that the greatest vertical stresses to be dealt with in the axle are those which accrue from the frame's striking the axle when the axle is bumped against it (as, of course, you appreciate that, when flexible springs are used, there must be a limiting point to the vertical movement of the axle). It was for this and other reasons that the springs were placed inside the frame, and not merely for protection from the road grit. Further, in connection with this, the bottom flange of our frame, being turned outwards, brings this point of striking still nearer the road wheel.

In the foregoing paragraph you will note we referred to "vertical stresses in the axle," because we have also found in severe road-testing that the greatest stresses in the axle are not vertical, but horizontal and, with a torque tube and cantilever "sprung" type of springs which are free at their ends, this occurs when the vehicle is backed against, for instance, a high curb with one of the wheels only taking the shock. This causes a most severe stress where the torque tube is joined on to the axle, and to get over this Rolls-Royce, for instance, use a large bell mouth on the torque tube rear end, while Marmon and Ford, for example, use tie-rods.

Our method of dealing with the shocks is entirely new, the rear end of the frame at this point being radiused from the center of the torque tube front ball end, so that, when the axle is moving vertically, it is always about $\frac{1}{4}$ in. from the frame, and when a shock such as above referred to occurs the torque tube and axle spring sufficiently to allow the axle to "metal up" with the frame, and so take the shock direct.

We have found this to give most excellent results. It entirely gets over the main reason for using the Hotchkiss drive, which has so many disadvantages in the way of unsprung weight, etc.

FERGUS MOTORS, INC.,
J. B. Ferguson,
Managing Director.

Tangential Cams

Editor AUTOMOTIVE INDUSTRIES:

DISCUSSIONS of cams are not usually broad enough to cover all forms of tangential cams. Even Mr. Hastings' excellent article in AUTOMOTIVE INDUSTRIES for Nov. 27, 1919, neglects to point out that pro-

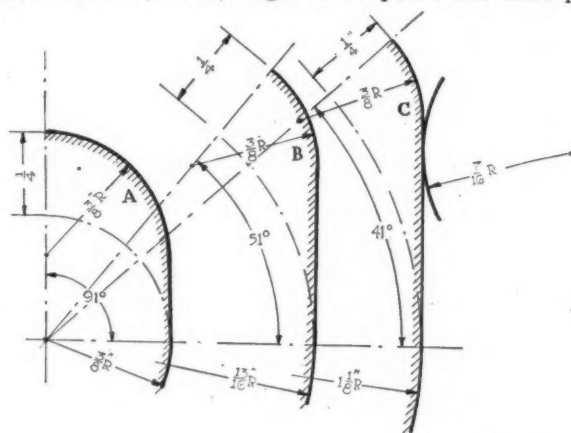
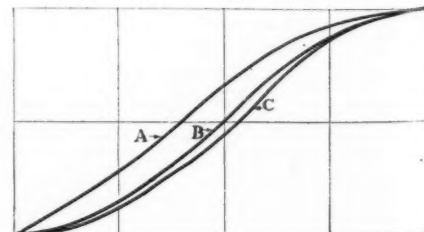


Fig. 1—Effect on lift curve of a change in base circle radius



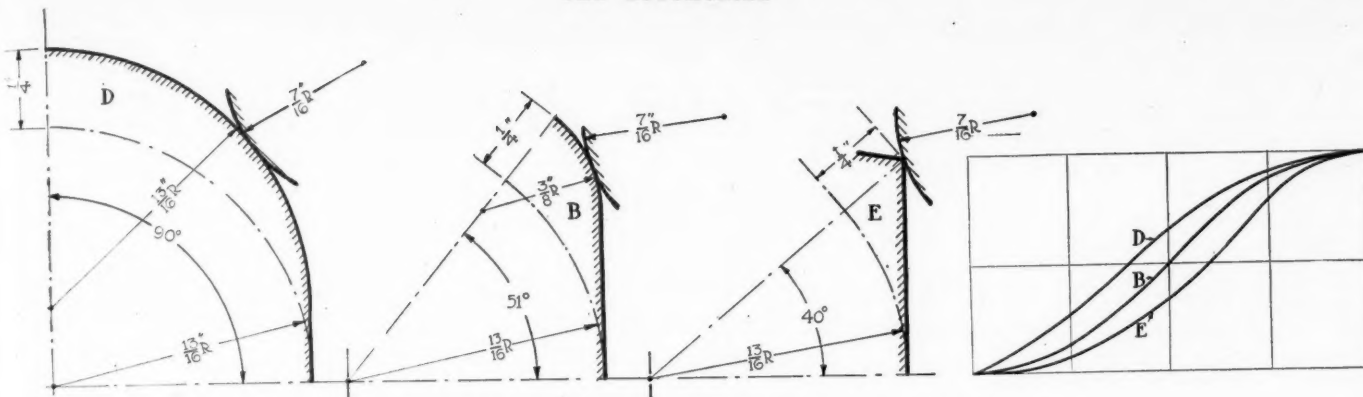


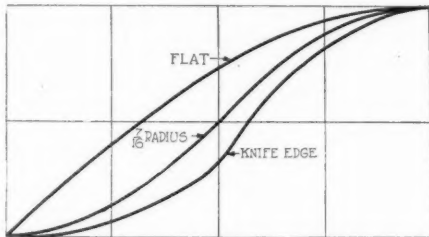
Fig. 2—Effect on lift curve of a peak change in circle radius

portions of tangential cams can be so varied that the lift curves can be materially changed.

Changes in the radius of the base circle will naturally change the time required to make the lift or the cam angle necessary to secure the entire lift. This is illustrated graphically in Fig. 1, which shows cams designed with $\frac{1}{4}$ in. lift with base circle radii of $\frac{3}{8}$ in., $\frac{13}{16}$ in. and $1\frac{1}{8}$ in., respectively. The lift curves for the same cams with $\frac{7}{16}$ in. radius followers are shown below. The center curve has almost uniform or constant acceleration, while the curves above and below show clearly the range of results which can be secured by merely changing the radius of the base circle.

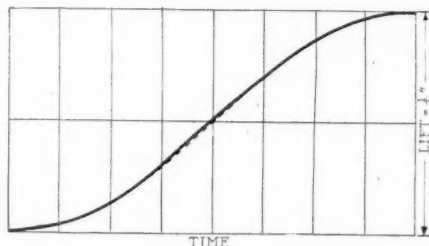
Changes in the peak radius also affect the angle required to make a full lift, as is shown graphically in Fig. 2. The cam with a peak radius equal to the base circle radius

Fig. 3—Lift curves obtained with different types of cam follower with the same cam



requires 90 deg. to make a full lift, while the cam with zero peak radius only requires 40 deg. The curves in this figure were also made with a $\frac{7}{16}$ in. radius follower.

The type of follower selected will materially affect the performance of a cam. Cam B, when used with a large mushroom or flat follower, gives the high arching curve shown in Fig. 3, but if a $\frac{7}{16}$ in. radius follower is used the curve has almost constant acceleration, as shown by the center curve. If a sharp knife-edge follower were

Fig. 4—Curve of lift obtained with cam B and $\frac{7}{16}$ in. radius follower superimposed on constant acceleration curve

used the valve would have less opening, as shown by the lower curve. Almost any curve between the two extremes can be produced by properly shaping the follower. A concave follower would give still different results, but probably they would not be interesting for automotive work.

Cam B with a $\frac{7}{16}$ in. radius follower gives very nearly a uniform or constant acceleration, as shown by the full line in Fig. 4.

Engines with rocker arms can often use cams with small lift by placing the rocker pin off center. This naturally gives more latitude in the design of the cam and possibly better results. Taking advantage of this point may permit the use of a tangential cam when a more complicated form might otherwise have been required.

The cams shown in the drawings cannot all be used for engine cams, but they do show clearly that a tangential cam does not necessarily give a fixed performance curve and is not always subject to the same criticism.

Stroke-Bore Ratio—Correction

Editor AUTOMOTIVE INDUSTRIES:

WOULD like to call attention to several errors occurring in my recent article entitled "Analyzing the Question of the Stroke-Bore Ratio" in addition to the more or less obvious one of the diagram for the short-stroke engine being turned upside down.

On page 1016 the expression for determining the inertia force should read

$$F = 0.0000142 w l N^2 (\cos \theta \pm \frac{1}{2n} \cos 2 \theta) \text{ pounds.}$$

On page 1019 the expression for the area of the long-stroke engine's piston should read

$$3.5 \times 0.7854 + 3.5 \pi \times 4 = 48.08 \text{ sq. in.}$$

Following this, the expression for the area of the short-stroke engine's piston, if it was 4.06 in. long, should read

$$4^2 \times 0.7854 + 4 \pi \times 4.06 = 50.99$$

On page 1018 the heads for tables 1 and 2 should read "Gas Pressure, Inertia Force and Resultant Pressure Acting Along Connecting Rod."

On page 1019 the first sentence in next to the last paragraph, referring to the effect of lengthening the stroke, should read: "It increases the weight of the crankcase (not crankshaft), which must be greater in diameter to accommodate the greater crank throws."

EDWARD G. INGRAM.

Overcrowded Foreign Vehicles

SOME idea of the factor of safety which is necessary in designing motor omnibuses may be gathered from the following conditions, described in the *Commercial Motor*. The Carnarvonshire Police Committee recently spent considerable time in discussing the question of overcrowding on public-service vehicles. The Chief Constable mentioned an instance of an omnibus being loaded with 85 passengers whereas it was only licensed to carry 40, while a member of the committee made the remarkable statement that on one occasion "no fewer than 110 persons were clinging like bees to a car licensed to carry 40."

Getting Workmen Interested in the Company

Educational work should strive primarily to arouse and maintain the interest of the workman in his company. This can be done by correlating ideals with facts, by eliminating "bunk" from talks to employees. Mr. Tipper shows the need for action, but points out necessity for clearly defined objective

By Harry Tipper

IT is to the credit of the automotive industry that it should have had less trouble with labor in the form of strikes and similar difficulties than most other industries. This young business was able to erect its factories with the modern understanding of the importance of light, air and good surroundings in mind. The business became sufficiently important within a short time to enable the manufacturer to give attention to the training of workers and the development of company spirit, and the character of its marketing endeavor induced a better understanding of the value of publicity in suggesting a favorable atmosphere.

Because of this background and this progressiveness in dealing with labor the automotive industry has the opportunity to lead in the further developments that are necessary in order to match the industrial progress with the new conditions. Labor in general is not interested in the changing of the government nor the political ambitions of the leaders as to Government ownership, partnership in industry and like programs.

The average worker is well aware, consciously or unconsciously, that he is not fitted for leadership and that he must follow and be governed by leaders. He is interested in leading an orderly, safe, social life, earning as much money as he can and securing work which is interesting, possesses possibilities of improvement and is as pleasant as possible.

Leaders Are Essential

Up to the present he has considered that it was more to his interest to follow the labor leader than to adhere to the employer. He has conceived a very definite allegiance to his craft and the organization of his craft. He has not considered that any allegiance was due to his employer or to the industrial organization in general. He follows the labor leader because of his faith in that leader and his confidence in the value of his objects.

He is quick to sense an injustice and to believe that he is being taken advantage of. His dense ignorance of the conditions of industry, the policy and purposes of the management and the meaning of the immense amount of money which is made as profit out of the industrial operations, make it obvious that he will regard as injustice much that may be necessary in this state of industrial development and believe that he is being taken advantage of, when the fault lies elsewhere.

It is hardly likely that all the actions which are made the subject of propaganda by his leaders and other interested politicians could be justified by those who are responsible for them. In fact, the present state of industrial organization is such that

there is enough of truth in the criticisms which are handed out by those who differ with its complexion to make it a difficult matter to deny them entirely or to explain them easily.

To the worker who has no knowledge of the fundamentals of industrial organization or the circumstances of its growth, who has no acquaintance with the company's ideals or policies, the inability to explain these matters so that he can understand them is additional evidence that he is being unjustly treated and that the industrial management are bent upon being secretive, because they are unfair.

Getting the Worker's Viewpoint

The beginning of the work of securing better relations lies in understanding the worker's point of view and the reasons for it. The word "understanding" is used advisedly in this case. It does not imply the kind of knowledge which most men possess of the creed they repeat in church or the constitution they swear to support. It implies the kind of knowledge which enables a man at any particular moment to visualize the circumstances that have given rise to any symptoms of trouble. This kind of knowledge may be secured by some men from study of observation; by most men it must be secured from a study of their experiences.

The education of the worker must be concerned first with the company, its organization, its necessities, its ideals and its policies. Unless the worker within the organization knows something about the organization itself, there is no chance for him to become interested. Unless he sees that the company is interested in having the organization explained and justified to its workers, he has no sense of organization affiliation. The worker is well aware of the labor organization policies, he understands its value to him, and his allegiance to his craft is a visible obligation in his mind. If he is to acquire any allegiance to the industrial organization with which he is working, he must become at least as familiar with its purposes, with its policies and with its value to him as a worker.

Providing Education

This sort of education should be provided for supervisors with greater detail, and more particularly as to their portion of responsibility for the carrying out, not only all the operations of the company, but its ideals of policy.

All this educational work should be applied to the particular company, and it should be so staged that

it relates in every case to the particular company's growth, activities and objects. It is only in this way that the proper kind of interest can be created, and the understanding of the worker brought to the proper point of accuracy for the purpose of establishing better relations.

This course of education should be laid out so that it will continually enlarge the objects of the employee's work in his own mind.

There is no doubt that one of the reasons for the better character of existing relations among the employees of the automotive establishments is that for a great number of these employees the object of the work which they perform is visible on the streets of almost every city and town in this country.

This interest which all men possess in the object of their work can be capitalized to the advantage of both parties by a careful consideration of the educational developments so that they emphasize this importance at every step.

Putting the Plan Across

Of course, care must be taken in pursuing such a plan of education to see that the statements which are made in connection with the organization, its ideal and policies are arranged so that they will appeal to the workers as reasonable. There is no use making the bald statement to a bunch of workers about the elimination of waste when they are all aware of waste going on around them in connection with their immediate work. The existence of the waste should be frankly admitted. The elimination of it should be pointed to as an ideal, the means which had been taken to eliminate it should be explained fully and the impotence of the company to complete its elimination without the aid of each worker should be admitted. A careful distinction should be drawn between the ideals of the organization and its performances in the pursuance of those ideals, so that the workers will understand definitely that the ideals are what the company is striving to accomplish, and the performance represented the distance they had been able to travel toward those objects.

On many occasions I have listened to the manager of a department or the manager of a business, explaining the ideals and policies of that department or business, and heard the men say afterward, "That's all nonsense, we know differently, because on such and such an occasion what happened was this," and each of the men would have a concrete illustration of the failure of the performance. The difficulty was that the supervisors in these cases had not sufficiently distinguished between the objects which they were striving to accomplish and the points which had been attained in the actual accomplishments. They did not admit what the worker knew to be a fact, and the worker threw doubt about the whole matter from this lack of understanding.

Value of Details

It is upon the details of this educational work that its value will rest finally. Staging this sort of work so that it will be natural, comprehensible and will incite belief, is just as difficult as staging a play, so that it does not appear to be ridiculous at any point.

It is for this reason that the educational work must be staged and outlined in considerable detail by a man who is familiar with what the worker thinks and with the way in which he will approach the question. It must be worked out with the knowledge that the worker expects to be handed a lot of "bunk" and is not at all backward in saying so.

The man who deals with it should understand that unless the statements jibe with the facts as the worker knows them from his daily work, any comprehension that might have been created otherwise will be lost.

The management of the company should give this man sufficient leeway so that he can work clearly with the employee's point of view in mind. They should thoroughly understand that a deficiency which is at present in the organization can be admitted to their own workers without any loss of respect and with a great accession of belief. The respect, in fact, which the workers should have for the management will be increased by a frank statement of the disparity between the ideals and the performances, inasmuch as the worker is sufficiently intelligent to have observed the difficulties existent to his work.

Talking Perfection

I do not know just where the idea arose, that talks with workmen should express altruism and a perfection of policy which could not exist in the present state of industrial organization, but I have heard scores of speeches of managers to employees which were so obviously "bunk" from this standpoint it would have been a reflection upon the employees to have taken the matter of the speech seriously.

If the educational work is started with the understanding that the worker is intelligent enough to make comparisons, close enough to the operations of the company to have the materials for those comparisons ready at hand, and suspicious enough to disbelieve anything which is not proved to him about the company's justice, square-dealing and value to him as a worker, it is possible in the course of a few months to win over the workers to the point where they have a measurable degree of respect and some measure of allegiance to the organization.

Educational Mistakes

The mistake which is made with this educational work frequently is in the establishment of the training in the hands of men who are not acquainted with the worker's habit of mind, his training and his ideas, and who are not sufficiently patient to see that every detail of the work is carried out with this point in view. It only takes one breath of suspicion to destroy the moral reputation of the public man, no matter how many years there may be behind that reputation.

And it only takes one instance of injustice to an employee to destroy the reputation of fairness which a manufacturer hopes to establish. In both cases the reason is the same, the lack of understanding, and therefore, an incipient suspicion.

In this as in other respects, the introduction of means especially arranged for the purpose of bringing about better relations for the employees, places a larger responsibility upon the management, and calls for a greater measure of wisdom. Positive action always demands a more careful analysis, an objective more clearly defined and a more accurate control of the detail.

To do nothing is to let the old suspicion stand; to do something is either to create new suspicion and confirm the old suspicions, or to wipe them out by creating a better understanding.

The fact that the situation can be improved by the proper form of education means also, of course, that the situation can be made worse by educational activities which are not properly considered and which are not suited to the purpose.

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Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907, and The Horseless Age (semi-monthly) May, 1918.

Uniform Vehicle Law

A PROPOSED Uniform Vehicle Law has been drafted by the Joint Committee on Uniform Vehicle Laws and is being distributed to the interested public. A more or less hasty examination of the proposed law indicates that it is a desirable draft. If one was to judge by the names of the members of the various committees drafting it, the proposed law should be the last word.

The idea of this editorial is not especially to approve of this draft of a law but to approve as heartily as possible of the idea of a uniform law for the various States. This is not a new or a novel idea, but there is no single job in designing, at present, more important than that of designing laws that will make the motor vehicle economical and satisfactory to the owner.

It has been believed for several years that the motor vehicle laws were gaining in sanity and usefulness, but within the last year there have been serious lapses. One State has gone back to county registration, several others have shown a tendency to tax the heavy motor truck off of the roads, and in others

there still is the tendency to heap taxes on the automobile owner to pay the entire road bill.

We do not believe that there is any tendency on the part of car owners to shirk any reasonable tax, but we do believe that there is a tendency on the part of the owner to believe that when he buys a car that he is entitled to get with the car the privilege of buying, at a reasonable fee, a franchise to use that vehicle in a reasonable way. The owner does not know much about how laws are passed, and it is up to the manufacturer and dealer organizations to help him. A good start has been made in drafting the proposed uniform law by committees representing the American Association of Highway Officials, the National Automobile Chamber of Commerce, American Automobile Association and the Highway Industries Association. It is to be hoped that all other trade associations will join with these associations in putting the idea across.

Just one more word. It is probable that this draft of a law will not suit every one in every detail, but when any supporter of this idea is convinced that this draft is fundamentally sound, he should waive his individual taste as to details and get behind the big idea.

Multi-Speed Transmission for Trucks

THE Class B military truck was the embodiment of a new principle in motor truck design—that the torque available at the driving wheels must be sufficient to slip the tires under all conditions. Previously the engines fitted to motor trucks had not been powerful enough nor the low gear ratios provided low enough to make this possible.

A surplus of power is no doubt a most desirable thing in war transportation work, but in commercial transportation it is subject to the objection that it involves rather low fuel economy under average operating conditions. If the engine fitted is large in proportion to the size and capacity of the truck, then the engine will be rather lightly loaded most of the time and will consequently operate at low efficiency.

At least two manufacturers of trucks have recently introduced multi-speed transmissions in which the regular three- or four-speed set of gears is supplemented by a set of back-gears in the same housing, but controlled by a separate lever, whereby twice the number of speed changes can be effected. This allows not only of a much wider range of gear reduction but of smaller steps between succeeding ratios. As the maximum reduction ratio can be materially greater than with an ordinary gearset, it is possible to do with a smaller engine and still be sure that the truck will be able to get out of difficult positions under its own power. A smaller engine would mean a higher average degree of loading and consequently greater fuel economy. There is a further chance for improving the fuel economy in the fact that the gradations in the gear reductions are finer and it is

possible to keep the engine running more nearly at its most economical speed.

From a fuel conservation standpoint this effort of taking care of extremes in draft conditions by a multi-speed transmission rather than by an over-size engine is to be commended.

Manufacturers' Shows

THE two manufacturers' shows for this year have been seen by the public and the verdict is rendered. It is not entirely complimentary to the exhibits. The criticism that is heard is strong and the praise is faint. Often are heard comparisons with the dealer shows held in New York and Chicago last year, and this is not favorable to the exhibits of this year.

This situation leads to an analysis of the shows and this comes back to the object of shows. Evidently the object is to stimulate interest, and consequently business, in the automotive vehicles. Granted that this is true, the show should be as interesting to the public as possible.

It was said that the manufacturers looked upon the shows this year as a great opportunity to rebuild their shattered sales organizations and as the first step toward the organization that will be necessary when the demand does not so far exceed the factory output. This being true, it would appear that the first duty was to interest the public and in this way reach the dealer. Consequently, the public must be interested.

Many years ago when the buggy and carriage men were fighting for the trade in these vehicles, the county fair was looked upon as the prime advertising opportunity of the year. Every carriage maker prepared especially for this exhibit, and he sent his brightest and best output to the fair. The man sending the most novel vehicles gained the most attention and consequently felt that he had made the best of his opportunity.

It appears that the automotive manufacturer is working on a different plan. He seems to send the most ordinary of stock models to the show, and this year the stock models are particularly uninteresting. It is said in explanation of this that the manufacturers have been afraid to change design during the last year for fear of stopping, to an extent, the production ability. This is probably an excuse, but hardly a reason. It is likely to become a stock excuse and to become a habit.

The automobile has not yet reached the fixed stage. It still is developing and the people know it and demand developments. They expect new styles of cars, just as they do of clothing and furniture. And to satisfy the public, this expectation must be satisfied.

Then, too, the automobile exhibitions at the two manufacturers' shows have contrasted strangely with the exhibits on Motor Row of the two cities. There everything is bright, the lighting effects good and the surroundings all that can be desired, as far as any person has been able to think it out. But these two shows were somber. The pleasant effect was lacking.

The answer may be that the dealers know the public better than the makers, or at least they better carry out their ideas. Perhaps when dealers give a show they are more free with the money. They probably look for profits in future sales, rather than in the show itself.

Federal Highway Department

A NATIONAL Department of Highways, headed by a National Highway Commission, would be created by a bill introduced into the House of Representatives by Congressman Baker. The bill would provide a department to construct and maintain a system of main and interstate motor truck highways, adapted to use by motor trucks engaged in transportation of heavy burdens. It would not include highways or roads inside the boundaries of any municipality of more than 2500 population.

The Department of Highways would be presided over by a secretary as a member of the Presidential Cabinet, who would appoint ten commissioners to be known as the National Highway Commission, and who would be organized to give a fair representation to the ten regional areas and to the interests of agriculture, commerce, native resources, education and economics, highway construction, manufacture, military engineering, motor truck transportation and passenger car travel and touring.

The plan, which is called the national plan, provides that states will relinquish title to rights of way and control of highways except in times of national emergencies, when they would revert to the state in full. The cost of construction and maintenance would be borne by the national Government, but the work of construction and maintenance would be under the direction of state highway authorities working co-operatively with the Department of Highways.

The bill would divide the country into ten regional areas, including Northeast, Middle East, Southeast, Northeast Mississippi, Southeast Mississippi, Northwest Mississippi, Middle West Mississippi, Gulf States, Northwest and Southwest.

The powers of the Secretary of Agriculture relating to highways would be transferred by the bill to the Department of Highways, including also the powers and duties of the Council of National Defense in relation to highways and public roads.

The bill will also meet the deficiencies where the population of the district falls below the national average to the square mile, with an appropriation equal to \$25,000 for each unit and fraction thereof indicated by the difference between the average population to each square mile of the principal states, and the average population to each square mile of the United States. This appropriation would be known as the equity population allowance, payable in five years in five equal amounts. Appropriation will also be made in land area of states which is unappropriated and unreserved public land owned by the Federal Government.

An appropriation of \$10,000,000 is proposed for the purpose of carrying out the provisions of the Act.

Pan-American Group Suggests Means to Improve Trade

Conferees at Financial Session Propose Investments in Latin America as Stabilizing Method. Would Improve Freight Service and Establish Air Routes.

WASHINGTON, Jan. 30.—The investment of American capital in Latin America, the adoption of the metric system, unification of roads and taxation, better protection for trade marks and copyrights, increased postal and telegraphic facilities, the inauguration of an inter-American airplane service, improved shipping facilities, reduced ocean freight rates, amendments to the Webb act and establishment of an international trade commission, were among the more important suggestions made at the Pan-American Financial Conference recently held.

The delegates from each country were emphatic in the assertions that greater prosperity and better relations would ensue if the United States would invest capital in Latin America. To this end the Inter-American International High Commission, which was formerly known as the International High Commission, has been asked to devote its efforts to establishing an international gold convention, to suggest methods for avoiding simultaneous double taxation of individuals and corporations in Latin American countries, and to secure uniform and equal treatment under the laws regulating foreign corporations in Latin America.

Various nations of the American continent have been requested to ratify the convention adopted at Buenos Aires concerning patents and copyrights. The Webb law, it was suggested, should be amended to permit American companies exporting or dealing in raw materials produced abroad to form organizations under proper Government regulations, which would enable such companies to compete on terms of equality with all other companies conducting such business.

That the metric system of weights and measures should be universally employed was recommended, with the suggestion that until such time as this is done articles marked by the standards used in the United States should also be marked according to the metric system.

Suggests Financing Method

That all Latin America has heretofore been financed by Europe, and debtor nations must bear moral obligations to return the savings of Europe when she needs them was pointed out by Dr. Jose Luis Tejada of Bolivia, who added that if the United States decided to grant help to Europe it could best do so by financing Latin America and allowing Latin America to pay its obligations to European countries. This would allow Latin America to take advantage of the condition of exchange and at the same time would work no harm to Europe.

Similarly Dr. Carlos Sampaio of Brazil

declared that Latin America is the proper field for North American enterprise. Brazil, he stated, is a rich land, of which 70 per cent has not yet been explored, and it is urgently in need of American enterprise and American capital. Dr. Sampaio alluded to the blow received by the Brazilian rubber industry through the cultivation of rubber in the Orient and urged that the United States should aid the further development of Brazilian rubber. All of the representatives of Latin America devoted practically their entire addresses to the urgent need of the investment of American capital in their countries.

Better Transport Facilities

The Transportation Committee of the Congress handled four subjects—maritime commerce, railroads, postal regulations and cable connection, and recommended substantial reductions be made in ocean freight rates and the establishment of regular freight lines between North and South America. The establishment of through rates between United States ports and ports not regular ports of call for the larger international freight lines was urged through an arrangement entered into with the coastwise shipping of the countries involved. A weekly shipping service, it was stated, should be arranged between New York and Buenos Aires by way of Montevideo, with bi-weekly sailings of passenger service from New York to Buenos Aires by way of Rio de Janeiro and Montevideo.

The Brazilian group, among other recommendations, urged that there should be an international training ground established for the development of international aviation service, with the idea of establishing an international aerial postal service between North and South America, including parcel post.

That both North and South America are engaged in great enterprises for transportation, mining, irrigation and industry and requiring the use of capital was asserted by W. G. P. Harding, governor of the Federal Reserve Board. He agreed with the Latin American officials in their statements that they must be aided by finances from the United States, but he declared the investments must be made in the hope of restoring normal conditions and preventing catastrophe rather than because of attractive rates of interest or favorable prospects of profit.

Edge Act Will Aid

The Edge Act, which was recently passed by Congress, said Harding, will be a considerable aid for the extension of business between North and South America, inasmuch as it provides for the incorporation of associations under Government supervision to engage in interna-

tional and foreign banking and other financial operations necessary to promote the export of American commodities. Corporations organized under the Edge Act will make foreign loans, particularly to Europe, which in turn requires many commodities and materials from South America, will make its credits received from this country valuable in Latin America, where they will be just as effective in liquidating European obligations in the United States as direct credits in New York would be.

Develops Fair Play

That the United States is developing a very fair spirit of fair play in its industry, which has been fostered by the Federal Trade Commission, was the assertion of Huston Thompson, Federal Trade Commissioner, who pointed out that any evidence of unfair competition or dishonest business practices, whether committed in this country or in foreign trade, may be brought to the attention of the Federal Trade Commission, with the result that the company engaged in such operations will be forced to end them.

This spirit of fair play in trade, stated Thompson, must be reciprocal, and while American competitors may police each other in foreign markets and report to the Federal Trade Commission, it is not fair that they should be obliged to observe honest practices from American competitors and suffer dishonest competition on the part of manufacturers from other countries. Consequently, he said, there must be the establishment of an International Trade Commission, founded on the policy of the American Federal Trade Commission, and through which all manufacturers or business enterprises would be guided in their business dealings. With the establishment of the International Trade Commission, a business man meeting with unfair business competition could report to the International Trade Commission, just as an American business man reports his dishonest competitor to the Federal Trade Commission.

Must Supplant Gold Standard

That there must be some new form for subsidizing exchange other than the gold standard heretofore observed was stated by Paul M. Warburg in his address before the conference on the fiscal and currency standards as the future measure for the credits of nations. Business, he declared, has changed within the last ten years as much as an airplane engine differs from that used in an automobile a decade ago. The problem of to-day, he declared, is a simple one. Instead of direct taxation, the important countries of the world have embarked upon an era of Government finances based upon low interest rates secured by inflation.

This enables the nations to purchase domestic goods and services at a cheap price for money, but at high prices for the things required, with the result that money has depreciated in value and unless Government credits and commercial conditions are stabilized, there cannot be a stabilization of financial exchanges regardless of the amount of gold poured into the world. If Government credits and commercial conditions, stated War-

N. A. C. C. Preparing to Move Into New Home

NEW YORK, Jan. 30—Having outgrown its home at 7 East Forty-second Street the National Automobile Chamber of Commerce plans to move, on May 1, to the new Marlin-Rockwell Building, Madison Avenue and Forty-sixth Street.

In the construction of the new building, the fourteenth and fifteenth floors of which will be occupied by the chamber, the plans have provided not alone for ample room for the new departments and rapidly expanding work of the N. A. C. C., but for a board room, 28 x 53, with vaulted ceiling, capable of comfortably seating 225 people. It is planned to make this room a central headquarters for meetings of various divisions of the industry.

The fourteenth floor provides for the executive officials and the active departments, including foreign trade, legislative, traffic, motor truck, rural motor express, service, publicity, statistical, show, highways, patents and others.

The fifteenth floor will be occupied by the Board Room, containing 1484 sq. ft., complete in modern design and equipped with shutters for eliminating daylight when lantern slides or moving pictures are used. Means are provided for turning the room into two or three smaller meeting rooms.

The present quarters of the N. A. C. C. were occupied first in 1900 by the National Association of Automobile Manufacturers, and the space expanded from time to time through the various reorganizations which eventually led to the formation of the National Automobile Chamber of Commerce.

burg, are stabilized, we may confidently undertake the stabilization of exchanges with the existing gold supply.

"We are living," declared Warburg, "in an era where the production of money and credit has increased and the production of goods has decreased. In order to emerge we must produce less credit and money and produce more goods. Where gold payments have been suspended and foreign exchanges have become demoralized, the restraining influence once wielded by gold must be exercised at this stage by rigid budgets. If governments adopt a rigid policy of preventing further issue of government securities and money for the purpose of covering current deficiencies, they will take the first and most effective step in combating the decrease of production, the rise of prices and the fall of exchange.

Transformed Markets Needed

"A country's ability without additional borrowing, to balance its regular budget, is the test of its solvency. The character of this test at this juncture will decide the measure of its future credit and upon that in turn will largely depend its power to rehabilitate its commerce and trade and its foreign exchanges. Because the present harm was done through excessive issues of government securities, so the

cure lies in arresting and, if possible, retracing that course. The world as a whole, since the beginning of the war, has been living in what business language would term a 'seller's market'; it must be turned into a 'buyer's market,' if we are to perfect a cure. In other words, goods must seek the market more eagerly than the market seeks goods. It is only in this manner that the flow of goods may again become subjected to a policy directed by the flow of gold."

Resolutions relating to each of the points considered as making for improved trade conditions, were adopted, and will be introduced into the channels designed for their enactment.

Turner Sales Co. Wins Service Co. Airplane

CLEVELAND, Jan. 30—The Turner Truck Sales Co., distributor of motor service trucks here, has won the airplane offered as prize in the recent sales contest conducted by the Service Motor Truck Co. of Wabash. This company operates a fleet of ten airplanes to deliver emergency repair parts.

As soon as the weather permits the aviation department will be transferred from winter quarters at Fort Worth, Texas, to Wabash, and immediately on opening the field some members of the Turner organization will be taught flying so that the prize can be flown home.

Dodge Establishes European Office

LONDON, Jan. 6 (*Special Correspondence*)—Dodge Brothers has opened a permanent district office in Oxford Circus House, 245 Oxford Street, London, controlling the British Isles and for the present Continental Europe.

TO MAKE MACHINE TOOLS

MILWAUKEE, Feb. 2—The Davis & Thompson Co. of Milwaukee has been incorporated, with a capital stock of \$100,000, to manufacture machine tools and other metal-working machinery, principally a continuous milling machine which has been developed in the last three years by Frank M. Davis and John Thompson. Both formerly were principal officers of the Davis Mfg. Co., Milwaukee, which now is operated as the motor works of the Avery Co., Peoria, Ill. A new plant will be erected in West Allis in the spring by the new corporation, which until now has been manufacturing its tools under contract.

DOUBLES SHOP CAPACITY

RACINE, WIS., Feb. 2—The Harvey Spring & Forging Co. of Racine, Wis., is placing in service a large shop addition which provides 45,000 sq. ft. and will enable it to double its capacity for making vehicle springs, forgings, etc.

Period of British Patents Now 16 Yrs.

New Act Also Grants Patentee Time Extensions Over War Periods

LONDON, Jan. 15 (*Special Correspondence*)—The new Patents Act is now in force. The most important of its alterations of former legislation are:

The period within which a complete specification can be lodged and an application filed with a provisional specification is extended from six to nine months.

A patentee can have his patent so marked as to indicate that he is prepared to grant licenses under it.

The investigation as to novelty is extended to publication in any document published in the United Kingdom.

The term of a patent is extended from 14 to 16 years.

Any patentee who can show that he has suffered loss or damage in the matter of a patent owing to a state of war may be granted an extension of the terms of the said patent.

No one other than a registered patent agent may describe himself as a patent agent, that is, one who for gain carries on the business of applying for or obtaining patents in Great Britain or elsewhere.

The two most important items are extension of the life of patents to 16 years and extension of patents which could not be worked or were otherwise injuriously affected by the war period. The House of Commons rejected this provision, which, however, was accepted by the House of Lords, the Government meanwhile having been induced to recognize that there was a real case for the protection sought.

An inventor will not now prejudice his rights to apply for and obtain a patent in respect to his invention if he reads a paper containing a description of it before a learned society. He must, however, before such reading, give notice of his intention, and must apply for a patent within six months of the reading or publication of the paper.

The famous provision in the Patent Act of 1907—concerning compulsory working of the patents—enabled anyone to petition the Board of Trade for a compulsory license. The new Act enables a patentee at any time after the sealing of the patent, to request that the patent be endorsed with the words "License of Right."

WILL EXTEND PRODUCT

HARTFORD, WIS., Feb. 2—The International Steel Products Co. of Hartford, Wis., at its annual meeting effected a reorganization and decided to enlarge its line of production beyond the U-Vee muffler or silencer for gas engines, heretofore its exclusive product. New officers were elected as follows: President, A. F. Schauer; vice-president, Andrew Portz; secretary, Andrew Martin; treasurer, Julius J. Goetz.

Tonnage Rating On Packards Eliminated

Type of Truck Sold to Be Determined by Requirements of Purchaser

NEW YORK, Feb. 4—Factory tonnage ratings on Packard trucks are to be eliminated, according to an announcement issued by the Packard Motor Car Co. Hereafter all models will be designated without reference to capacity. Under the new ruling the term "3-ton truck" is taboo. This truck will be known as size D.

In connection with this action the Packard announcement says: "We are wiping out a trade practice that is not only unfair to our trucks but is misleading to the buying public. The old system of factory tonnage ratings confuses the problem of truck transportation and in condemning it we are clearing the way to a better understanding of truck performance."

"At its best," the announcement continues, "the factory tonnage rating is a crude estimate of truck performance, and the automobile industry can no longer tolerate crude estimates. By building into trucks a large factor of safety and by putting our transportation engineers at the service of purchasers we have done much to remedy the evils of misunderstanding springing from the old system. The elimination of factory tonnage rating is the next logical step. We shall take each truck sale as a distinct problem in hauling and our engineers will advise the purchaser as to the truck he needs to meet his individual requirements."

Hereafter all Packard trucks will bear a plate on which will be stamped the name of the purchaser and the duty for which the truck was sold. In case of resale the Packard engineer must be consulted for the purpose of giving a new rating to the truck, if a change in conditions require it.

FOREIGN OPPORTUNITIES

WASHINGTON, Jan. 30—The Bureau of Foreign and Domestic Commerce, Department of Commerce, has received requests for automobiles or parts agencies of business from individuals and companies in foreign countries. These are listed below. For further information address the Bureau of Foreign and Domestic Commerce and specify the Foreign Trade Opportunity Number.

A commercial agent from Italy is in the United States for a short time and desires to secure an agency for the sale of automobiles and motor accessories. References. 31863.

An industrial and commercial agency in France desires to purchase and secure an agency for the sale of automobiles and bicycles. Quotations should be given c.i.f. Lagos. Correspondence may be in English. Reference. 31868.

A firm in England desires to purchase motorcycle and bicycle parts and accessories. Quotations should be given c.i.f.

Liverpool or London. Reference 31890.

A company in India desires to purchase and secure an agency for automobiles. Quotations should be given c.i.f. port in India. Payment, cash against documents or bills at 30 days' sight. References. 31891.

A man in France established in the automobile and garage business wishes to secure an agency for an American low-priced car, a truck, trailer and motorcycle. Reference. 31910.

A firm in Norway desires to purchase and secure an agency for the sale of automobiles, motors and accessories. Quotations should be given c.i.f. Norwegian port. Payment through banks in Norway. References. 31914.

A builder of automobiles in Belgium desires to purchase all materials, parts, etc., which are used in the construction of chassis and bodies for automobiles. Quotations should be given c.i.f. Antwerp. Payment, cash. Correspondence and catalogs should be in French. References. 31908.

Stutz Co. Plans 5,000 Production in 1920

INDIANAPOLIS, Jan. 31—The annual report of the Stutz Motor Car Co., to be issued in February, will show total sales approximating \$7,500,000 in 1919, compared with sales of \$3,536,558 in 1918 and \$4,483,315 in 1917. Net profits from the year are expected to approximate \$1,000,000, or \$10 a share on the 100,000 shares of capital stock outstanding.

With the addition of the new buildings now nearing completion it is expected that production this year will reach 5000.

TO START PRESTON PLANT

BIRMINGHAM, ALA., Jan. 30—Contracts for all buildings and equipment of the Preston Motors Corp., recently organized here, have been awarded, and work is soon to begin. The company expects to manufacture from 2500 to 3500 passenger cars, trucks and tractors in 1920. R. A. Skinner is president and general manager. He was formerly with the Hudson Motor Car Co. and the Continental Motors Corporation.

INCORPORATE BODY CO.

CLEVELAND, OHIO, Jan. 31—The Hess Body Co. has been incorporated with a capital of \$100,000 to manufacture bodies and equipment. The incorporators are L. D. Blout, W. L. Redhead, Harry Hess, E. B. Underhill and T. D. Lamb.

INCREASES TIRE OUTPUT

COLUMBUS, OHIO, Jan. 31—C. O. Henderson, president of the Henderson Tire & Rubber Co., announces that beginning Feb. 1, a night shift will be put at work at the new factory here. The present output is 800 tires daily, and this will be increased to 1500 daily. The plant at Bucyrus, Ohio, is being abandoned and all machinery is being moved to the Columbus plant.

Allot Space for 180 Displays at Detroit

DETROIT, Jan. 31—Manager H. H. Shuart of the Detroit Automobile Dealers' Association has allotted booths for 180 displays at the Detroit automobile show, Feb. 14 to 21. Five floors of the big Ford Building in the heart of the automobile district will be utilized for the display of passenger cars, trucks, trailers, tractors and equipment.

There will be 70 makes of passenger cars, including at least five that were not ready for the New York and Chicago shows, 45 complete lines of trucks, and a list of equipment three times as great as ever before exhibited in Detroit.

Enforce Peace Treaty as Regards Aviation

PARIS, Jan. 17—(*Special correspondence.*)—This week a French technical commission left Paris for Germany to see that the clauses of the Treaty of Peace relative to aviation are fulfilled. This commission is under the control of Colonel Dorand, who during the war was director of the technical section of the French Air Service. The members composing the commission are partly military and partly civil. Among the latter are Gustav Callois, former race driver, now attached to the Lorraine-Dietrich factory; Guerin from the Farman factory; Sossaulens from the De Dion Bouton Co., and representatives from the Morena, Gnome, and Renault factories.

According to the treaty of Versailles, Germany shall not construct any aviation material for war purposes. The object of the technical commission is to see that this clause of the treaty is observed.

COMMERCE BUYS GROUND

DETROIT, Jan. 31—Commerce Motor Car Co. has acquired two more acres of ground adjoining the present location. The site includes the corner of Mackie and Greene streets. As soon as present additions, under construction, are completed a building will be erected on the new site. The company is making plans to double its production of trucks in 1920.

CHANGE BATTERY NAME

LOUISVILLE, KY., Feb. 2—The Peerless Storage Battery Co., Louisville, maker of Peerless Red Cap storage batteries, has filed amended articles of incorporation, changing the firm name to the Wolke Lead Batteries Co., and has registered the name Wol-Kee Red Cap for their starting and lighting batteries.

OPENS NEW YORK OFFICE

NEW YORK, Jan. 30—The Bunyan Manufacturing Co., of Cleveland, manufacturer of the "Liberty Bell" automobile signal, has announced the opening of an eastern office at 254 West Fifty-fourth Street, New York.

Canada Car Imports Yield \$13,886,097 Tax

OTTAWA, Jan. 30—A statement from the Department of Customs showing the value of automobiles and parts imported and entered for consumption in Canada during 1919, also the duty, customs war tax and excise tax collected thereon, reveals the fact that automobiles and parts thereof during that period yielded the surprising revenue of \$13,886,097.25.

Under the heading of passenger automobiles the customs figures give the total of 9637 machines valued at \$9,304,235. The duty on these was \$3,255,465.50, customs war tax \$697,614.27, and the excise war tax \$4,649,450, making a total duty of \$8,602,528.77.

Commercial automobiles to the number of 2113 were valued at \$3,437,464. The duty on these was \$1,200,207.90, customs war tax \$257,228.90. There was no excise war tax on this class of vehicle or on automobile parts. The total for commercial vehicles was \$1,457,436.80.

Automobile parts valued at \$9,979,041 brought \$3,077,988.39 in duty and \$748,142.29 in customs war tax, a total of \$3,826,130.68. The grand total of \$13,886,097.25 includes war tax levied on imported automobiles and also on those of domestic manufacture.

Plan Large Output of New L. M. Axle

CLEVELAND, Jan. 30—The new L. M. axle which has been built and tested for four years at the plant of the Winton Motor Car Co., in Berear road is to be put on the market on a large scale. The L. M. Axle Co. has increased its capital from \$25,000 to \$1,500,000 and has purchased a fifteen acre tract for its factory. The axle is named for Leon Melanowski, a Polish engineer who for sixteen years was identified with the Clement Bayard Co. of Paris, four years with the Winton Co., and eleven years with the White company.

W. H. Cowdery, president of the American Fork & Hoe Co.; C. A. Forster, president of the Cleveland Packard Co.; J. L. Vaughn, secretary the Parker Appliance Co.; W. H. Kinsey, G. W. Codrington, A. H. Bedell, Capt. R. L. Queisser, Holmes Conrad, H. E. Shimmin, and Louis Otto are members of the board of directors and officers of the company.

SELL PLANE SUPPLIES

NEW YORK, Jan. 30—The Director of Sales of the War Department announces that the Material Disposal and Salvage Division of the Air Service has completed inventory of its surplus war material and has resumed sales.

Bulletins listing the material have been prepared and are being mailed to prospective purchasers. Included in the materials offered are motor equipment, chemicals, oils and paints, fabrics, lumber, shop equipment, electrical equipment and miscellaneous articles.

The materials are located in different

points of the country. Copies of the bulletins and additional information relative to the terms of sale may be obtained from the Material Disposal and Salvage Division, Air Service, Washington, D. C., or from the district office of the Air Service in any of the following cities: Boston, Buffalo, Chicago, Dayton, Detroit, New York, and San Francisco.

Wallace to Manage British Truck Works

LONDON, Jan. 16 (*Special Correspondence*)—Sam Wallace, engineer and organizer of the Associated Equipment Co., which builds the London General Omnibus Co. buses, has severed his connection with the company. After a visit to the United States, it is reported, he will return to England to take over the Government's truck reconditioning works at Slough. Wallace was loaned to the Ministry of Munitions, literally, to lift the Slough enterprise out of the "slough of despond."

His success leads to the belief he will be retained there permanently.

REORGANIZE RUBBER CO.

WATERTOWN, WIS., Feb. 2—The Pan-American Rubber Co., which recently moved its factory and general offices from Milwaukee to Watertown, Wis., has reorganized its directorate to give Watertown capital proper representation. The new officers are: President, Max G. Kusel, Watertown; vice-president and general manager, C. Christman, formerly of Chicago; secretary and treasurer, O. C. Wertheimer, Watertown; director, Ferd. Saxmann, Milwaukee. The capital stock is \$200,000.

Court Rules Ohio Tax Constitutional

Graduated Tax on Cars Saved Because Funds Revert to Maintenance

COLUMBUS, O., Jan. 30—Holding in effect that the provisions of the recently enacted graduated automobile tax in Ohio do not exceed privileges automobilists derive from the use of the highways, and that if it so desired the legislature could go back to the old tollgate idea, Judge Kinkead in the Franklin County Courts has held the recently enacted law constitutional. The action to have the law declared unconstitutional was featured by the Ohio Automobile Association and dozens of automobile clubs throughout the state. The action will probably be taken to a higher court for decision.

The provision that saved the present graduated law from being held unconstitutional according to the court was that of having all of the moneys derived from the tax applied for the repair and maintenance of highways.

In 1913 a similar law was passed but as the funds derived from its enforcement went into the general fund, the same judge held the law to be unconstitutional. The law provides that 50 per cent of the funds is to go into the state repair fund and the remainder into the repair fund of the taxing district, usually the county. Attorneys C. D. Saviers of Columbus and Judge Walter D. Meals of Cleveland represented the Ohio Automobile Association in the action.

Application of the new law will be withheld temporarily, according to an announcement from the Secretary of State's office, until the opponents have had opportunity to appeal the decision.

Whippet Plane with Folding Wings



This illustration shows the Austin whippet airplane which is now in production by the Austin Motor Co., Ltd., Birmingham, England. The wings can be folded back, enabling the machine to be stored in a building 18 ft. long by 9 ft. wide and 8 ft. high. The first batch of fifty machines is now under construction. Cross country flights under varying conditions have been made. With a six-cylinder Azani engine, it climbs 5000 ft. in 8 minutes and has a ceiling of 10,000 ft. with a maximum speed of 90 m.p.h. It has a landing speed of 35 m.p.m. The price is about \$2,000.

Distributor Sues to Restrain Rival

Would Stop Former Partner from Using Mailing List and Trade Methods

ATLANTA, Jan. 30—The suit recently filed here in the United States District Court by the Benton-Bailey Co. of Richmond, against Bailey & Co., Inc., of Atlanta, is attracting considerable interest among automobile dealers in the southern field. Both of these companies are well known wholesale distributors of automobile parts and supplies in the south.

The principal allegation made in the complaint is that A. H. Bailey, now president of Bailey & Co., is operating in his business the same plans and systems that the Benton-Bailey Co. has been using for years, and which the plaintiff claims are protected by copyrights. It is further alleged that A. H. Bailey appropriated for his own use certain electros and plates which had been used in the plaintiff's catalog, and that he also secured their mailing list and is now making use of it as president of the Bailey Co.

They allege that they had established the system of operating their business through what they call their "Broadside" selling plan. This is also used as a trade name as is the name "Stonewall." The company claims to have established the business that has obtained a volume of \$80,000 monthly.

Unfair competition is charged and the court order has been sought compelling Bailey & Co. to give up its mailing list and discontinue conducting its business under the present system. Damages of \$50,000 are asked.

Bailey's answer in the suit is a sweeping denial of all of the allegations.

He says that the names, "Stonewall" and "Broadside" were never used. He admits using the expression "Better Business" and also "Yours truly," "Yours sincerely," etc., and says that they constitute a part of the names of the catalog and are just plain English words which anyone has the right to use. "The plaintiff has no monopoly on the English language," he says.

"In every possible way," Bailey says, "the defendants have thought by positive acts to tell the whole world that they are not in any way connected with any other business."

Expect Meredith to Favor Commission

WASHINGTON, Feb. 2—The Senate has confirmed the appointment of E. T. Meredith as Secretary of the Department of Agriculture, and as a result advocates of the Federal Highway Commission are looking forward with more assurance toward the passage of this bill. Secretary Houston was opposed to the measure and was regarded as a formidable opponent to its success. Secretary Meredith, long an advocate for good roads, is counted upon to aid the bill, which will provide a Federal Highway Commission.

KING BUYS PROPERTY

DETROIT, Feb. 2—The King Motor Car Co. has purchased a large manufacturing property on the west side of Detroit and east of the River Rouge, bounded by Leigh Avenue and the M. C. railroad tracks, on which it is planned to erect a new factory.

Demonstrate Tractors in New South Wales

WASHINGTON, Jan. 30—Recent demonstrations of farm tractors at the Wagga (New South Wales) experiment farm had a distinct educational value for prospective buyers, according to reports received by the Bureau of Foreign and Domestic Commerce.

The tractors represented were:

Jelbert, a Victorian machine of 16 hp., which was pulling a three and four furrow disk plow.

Wallis, an American wheel type, with a single guiding wheel, of 15 hp., which pulled a four furrow disk plow.

Titan, of American manufacture, of 10-12 hp., which drew a five furrow moldboard plow. This tractor was distinguished by a self-steering arrangement which enabled the driver to attend to the plow if necessary.

Fordson, a light machine, weighing 25 cwt., of 22 hp. at the belt, and drawing a four furrow stump-jump moldboard plow. This was fitted with an arrangement by which the shares could be raised or lowered from the driver's seat.

R. & P., an American type, drawing a five furrow disk stump-jump plow.

Cletrac, the only representative of the caterpillar type, rated at 12-20 hp., which pulled a four furrow moldboard plow.

BUYS RADIATOR PLANT

JACKSON, MICH., Jan. 31—Sparks-Withington Co. has purchased the plant of the Cleveland Radiator Co. at Cleveland. The company will be incorporated with the Sparks-Withington Co., and a big building program is being outlined to take care of the business gained by the consolidation.

SPEED SPANISH TRAIL

SAN ANTONIO, TEX., Jan. 30—The Old Spanish Trail, the Lincoln Highway's Southern rival, connecting California and Florida, is being developed by the Old Spanish Trail Association, which reports that the project is 50 per cent complete, or with money in hand to build. It is planned to have the trail open for motor travel between Los Angeles and New Orleans by the winter of 1920-1921. The executive offices of the association are in the Bedell Building, San Antonio.

TO MAKE VAPOR DEVICE

SPARTA, WIS., Feb. 2—E. J. Brandau of Sparta, Wis., is establishing a plant for the manufacture of an auxiliary device to introduce hot vapor or steam into the combustion chamber of gas and oil engines. Brandau has patented the design.

DUNBAR SOON ON MARKET

DUNBAR, W. VA., Jan. 30—Production of 500 tires a day is estimated by officials of the Dunbar Tire & Rubber Co., which is to begin operations here in March.

German Air Losses in War

2483 Killed, 3327 Wounded

(Special Correspondence)

PARIS, Jan. 17—Germany lost 2483 aviators and had 3327 wounded during the war, according to figures just made public at Berlin. In August, 1914, the German army had 246 airplanes in service on the front. By 1918 this number had been increased to 4050. The following are the figures relating to German aviation as given out by the Aero Club of Berlin:

	Aug. 1914	Nov. 1918
Airplanes in service (scout, bombardment, reconnaissance)	246	4050
Defense squadrons for interior service	18	108
Pilots at the front	500	5000
Aeronautical personnel for interior services	500	80,000
Monthly consumption of gasoline (gallons)	17,000	2,000,000
Planes fitted with wireless photography	100	2000

GERMAN AIR LOSSES DURING THE WAR

	At the Front		At the Interior	
	Killed	Wounded	Killed	Wounded
Pilots	783	426	1020	652
Observers	176	305	312	425
Mechanics	96	19	138	13
Pilot pupils			430	439
Observers			159	247
Mechanics			49	32
			40	51

Packard Repudiates Martens Statement

NEW YORK, Feb. 5.—Repudiating the statement said to have been made before the Senate foreign relations committee by Ludwig A. K. Martens, self-styled "Ambassador" of the Russian Soviet Republic, that the Packard Motor Car Co., among other prominent American manufacturers, were eager to do business with the Soviet Government, William C. Chapman, export advertising manager for the Packard company here, said:

"If this man Martens says that the Packard Motor Car Co. has a positive desire to enter into export relations with Soviet Russia he is an unmitigated liar."

"The Commercial Department of the Russian Socialistic Federal Soviet Government began their overtures last July—the initial letter told how the Soviet Government was prepared to enter into 'tentative contractual relations' with Detroit manufacturers, and contained the following paragraph: 'You can take it or leave it, but we wish to call your attention to the fact that there is only one purchasing power and one market in Russia to-day—that of the Russian Soviet Republic.'"

"Colonel Cardway, export manager for the Packard company, thought he might be able to secure some information of value to the Government so he invited the Bolsheviks to send one of their representatives to his office and talk things over. Evidently they smelled a rat as no agent appeared, though the Packard company was placed on the Bolshevik mailing list and bombarded with literature ever since."

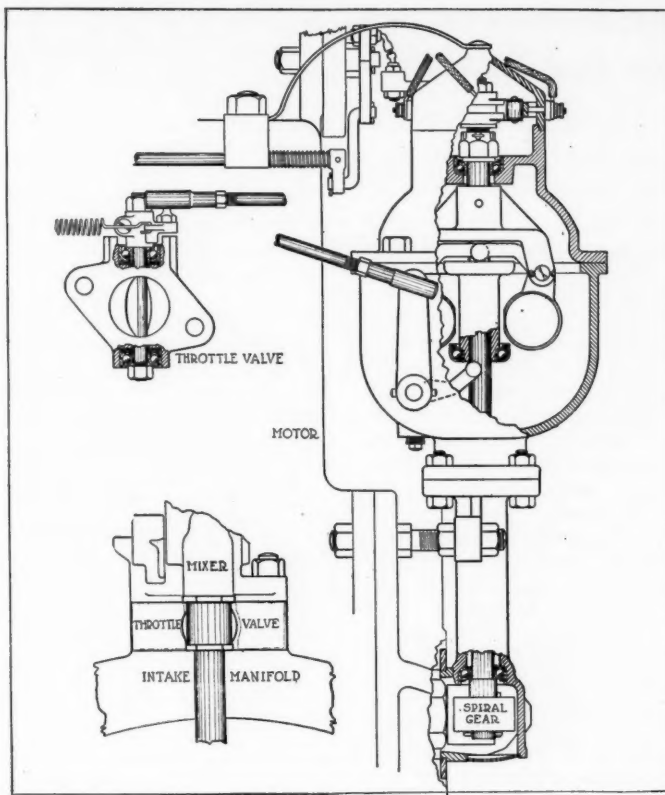
In the Packard statement Colonel Cardway advances the opinion that the Bolshevik Government never had an honest desire to open commercial relations with America, but laid its snares in the hope of getting replies that could be construed as favorable when the inevitable day in court arrived.

"This," the statement continues, "is borne out by 'Ambassador' Martens before the Senate committee when he produced with suspicious promptness all the names of the manufacturers on his mailing list, regardless of whether they had been active correspondents."

Crow-Elkhart Plans 10,000 Output for 1921

ELKHART, IND., Feb. 2.—At a meeting of the stockholders of the Crow-Elkhart Motor Corp. at the home office of the company, Phoenix, Arizona, Jan. 20, the following were elected directors for 1920: M. E. Hoshaw, J. A. Harps, C. S. Drake, R. B. Donaldson, Robert R. Mills, M. F. Miller and C. B. Lair.

The directors met at Elkhart, Jan. 27, for organization, and plans for 1920. The following officers were elected: J. A. Harps, president; M. E. Hoshaw, C. S. Drake and R. B. Donaldson, vice-presidents; D. C. Thomas, secretary and assistant treasurer; R. B. Donaldson, treasurer and general manager.



Faco Governor on Fordson Tractor

NEW HOLSTEIN, WIS., Feb. 5.—A governor specially suited for use on tractor engines is being manufactured by the Tractor Appliance Co. of this city. The device is of the flyball type and is designed to act quickly upon change of load. Ball bearings are used on the governor shaft and also take up the end thrust of the control spring. Installation on the Fordson tractor is said to be merely a matter of an hour's time for one man, with only such tools as are provided with the tractor. There are no holes to be drilled, and the entire device fits into the tractor and forms a part of it without detracting from the appearance. A speed regulation of 10 per cent is guaranteed by the makers

Plans were made for a 5000-car production and funds were provided for carrying out this program. The entire output of the factory for 1920 has been contracted for, and extensions are contemplated which will increase the capacity of the plant to at least 10,000 cars for the season of 1921.

No Change in Gary Control Says Dawson

NEW YORK, Feb. 4.—The report that the Gary Motor Truck Co. of Gary, Ind., has changed hands has been denied by Frank Dawson, general manager. Dawson explains that the report was started when distributors of Gary stock in Kansas City and Des Moines purchased some of the stock, giving Dawson and his friends absolute control. Dawson announces that no change in policy is anticipated, but plans have been made to increase production to 400 a month in factory additions to be built on recently acquired land adjoining the present factory.

Assemble All Fordson Tractors in St. Louis

DETROIT, Feb. 2.—Henry Ford & Son have discontinued assembling tractors at the Dearborn plant, thereby increasing production from 175 to 350 tractors a day. The tractors now are sent out knocked down to the St. Louis branch and there assembled. The decision to discontinue assembling was reached primarily in the hope of increasing production and also in the effort to relieve freight congestion and overcome the handicap of car shortage which is being felt severely by all manufacturers.

BODY PLANT DESTROYED

MILWAUKEE, Feb. 2.—The plant of the George Grede Co., 240-248 Reed Street, Milwaukee, one of the largest painting, trimming and repair works in Wisconsin, was almost totally destroyed by fire Jan. 22. Nearly 100 cabs for motor truck bodies built under contract were destroyed. It is proposed to re-establish the business in new quarters immediately.

Brazilian Farmers Eager for Tractors

Demonstrations Under Government Supervision Expected to Develop Keen Demand

WASHINGTON, Feb. 3.—That a good market for farm tractors exists in the State of Sao Paulo, Brazil, due to the growth of the Brazilian textile industry, which has stimulated cotton production, is reported by Consul C. L. Hoover to the Bureau of Foreign & Domestic Commerce. Likewise, the low price for coffee and the unfavorable exchange rates are forcing planters to take up other lines of agriculture. An immense packing plant has been erected, creating a demand for cattle, hogs and sheep, for which the farms of the State must be adapted, which in turn will mean the raising of corn and improvement of pastures.

The State Government maintains an agricultural college called the Escola Agricola Luiz de Queiroz, the director of which has recently returned from the United States, where he studied the farm tractor and is now engaged in emphasizing its benefits to the Brazilian farmers.

There is, as yet, no preference for any particular type of tractor, as all of them seem to be regarded with equally friendly interest or perhaps curiosity. A few days ago a caterpillar type of tractor manufactured in the United States was seen in a demonstration, and all the farmers who witnessed its performance expressed their belief that such machines would soon be as common on the plantations as automobiles are in the city; that is, every one who could afford one, would have it.

The matter of obtaining satisfactory agents for tractors will present some difficulties, as the dealers in agricultural machinery are not yet convinced that a demand exists and are consequently unwilling to tie their money up in something they are afraid they can not sell. However, the indications for a future demand are favorable, and manufacturers should keep this in mind.

Big Chicago Show Meets Trade Demand

CHICAGO, Feb. 2.—Chicago's twentieth annual passenger car show and first truck exhibition came to a close Saturday with a new attendance and business record set. Dealer attendance at the show has been large. Most of the distributors in Chicago brought in many dealers while distributors from other cities also availed themselves of the opportunity to get together with their dealers during show week.

It is impossible to arrive at exact figures in regard to the amount of business actually transacted at the show, but the numerous dealer dinners and meetings indicated that this was in proportion to the increased attendance.

Only four cars were shown in Chicago during the national exhibition which had

not been shown at New York or about which the trade had not been thoroughly informed. These were the Kurtz, displayed at the Lexington Hotel; the Skelton, exhibited at the La Salle, and the Kenworthy and Shaw, displayed at the automobile salon at the Congress Hotel.

The salon was a center of interest for persons interested in special body designs, but proved disappointing to persons who had an opportunity to compare the Chicago sales with the one held at New York. There was a limited number of exhibits and while some of the new body designs were extremely interesting and attractive, they were, for the most part, far below the standard of special body designing shown at New York.

Bonus for Babies

DETROIT, Feb. 2.—Circulars announcing a "baby bonus" for members of the "family" of the United States Motor Truck Co. of Covington, Ky., have reached Detroit. The company offers "any employee to whom a boy baby is born in 1920, \$50; to any employee to whom twins are born, \$100, and for triplets, \$400."

Fisher Body Buys Saginaw Glass Co.

SAGINAW, MICH., Jan. 31.—Fisher Body Corp. of Detroit has purchased the Saginaw Plate Glass Co., employing 500 workmen. The local plant will be united with the Columbia Glass Works of Blairsville, Pa., and the Federal Glass Co. of Ottawa, Ill., and will operate under the name of the National Glass Co.

An extensive building program is planned to add 50 per cent to the capacity of the Saginaw plant, bringing its production to 4,000,000 sq. ft. of plate glass annually. The price paid by the Fisher Body Corp. was not given out but unofficial statements put it at \$2,000,000.

ABANDON TORONTO SHOW

TORONTO, Feb. 2.—Owing to the fact that the committee appointed by the Toronto Automobile Trade Association were unable to secure a suitable building for motor show purposes despite indefatigable efforts, the association decided to abandon the idea of holding a show this winter at the meeting last Monday.

TO BUILD SMALL TRACTORS

ELYRIA, OHIO, Feb. 2.—The American Implement Co. is planning the erection of a new plant for the manufacture of small tractors. It recently increased its capital stock from \$300,000 to \$2,000,000.

NAMED ITALIAN AGENT

NEW YORK, Feb. 5.—Ing. Mario Ferraris has been appointed distributor in Italy of the American Bosch Magneto Corp. products.

Farm Engineers to Extend Association

ST. JOSEPH, MICH., Jan. 30.—The American Society of Agricultural Engineers is endeavoring to extend its membership and influence. The society concerns itself with all kinds of farm-operating equipment, both machines and buildings, as well as with irrigation, drainage and rural roads.

Recognition of the work of the society has recently been accorded by the National Implement and Vehicle Association, which entered into a co-operative arrangement with the society whereby the latter becomes virtually an engineering section for the manufacturers' body. This arrangement was effected in the latter part of 1919, resulting in the formation of a joint general committee made up of representatives from the two bodies and designated as the American Agricultural Equipment Standards Committee.

As the name indicates, the work of this joint committee is primarily that of determining the most desirable standard practice and formulating it for use by the manufacturers in order that farmers, dealers and manufacturers may have the benefit of standardized construction wherever it is practicable. Standards so adopted will be known as American Agricultural Equipment Standards. To make the work of this committee as sound and valuable as possible, it is provided that whenever the matter under consideration renders it advisable representatives from other engineering bodies will be invited to participate in the deliberations.

F. N. G. Kranish has succeeded Raymond Olney as president of the A. S. A. E. Chairman of committees have been appointed as follows: Research and data, E. A. White; farm power and machinery, L. W. Chase; farm structures, W. G. Kaiser; drainage and irrigation, J. A. King; roads, E. B. McCormick.

Willard Co. Officials Speak at Convention

ATLANTA, GA., Feb. 3.—Prominent officials of the Willard Storage Battery Co. of Cleveland attended the annual convention of the Southeastern dealers and representatives of the company, which was held in Atlanta Monday and Tuesday of this week. J. S. Dunbar, manager of the Atlanta branch and district manager of the Southeastern territory, acted as host to the 125 representatives of the company who attended the sessions.

Those present from the Cleveland office, all of whom delivered addresses on the program, were S. W. Rolph, renewal salesmanager; H. S. Bentley, manager of sales production; S. E. Baldwin, advertising manager, and E. Elmo Martin, efficiency expert of the organization.

A general survey of the prospects for 1920 was made and plans discussed for greatly increasing the company's volume of business in the Southern territory. The meeting was one of a series being held in all parts of the country.

Get LaFayette Plum in Chicago and Kansas City

CHICAGO, Feb. 1.—J. Henry Smith has been appointed distributor for LaFayette cars in Chicago. Smith is known to the automobile trade as salesmanager of the motor parts department of the Rich Tool Co. of Chicago. Associated with Smith is his brother-in-law, Harold M. Plamondon. Smith and his associate assumed their duties immediately at the Auditorium Hotel, where the LaFayette made its debut to the middle west during the Chicago automobile show.

R. R. Bush and R. A. Nicolls have secured the franchise in Kansas City, the former to be president, and the latter vice-president and active manager of the concern. Nicolls recently resigned as general salesmanager of the Greenlease Motor Car Co., Cadillac distributor in Kansas City. He had charge of Cadillac sales in that territory since 1914. Bush is president of the Southwest Motor Co., distributing Nash cars in the southwest.

The sales organization of the LaFayette company is being shaped by E. C. Howard, vice-president, formerly general salesmanager of the Cadillac Motor Car Co.

Salesman Swindler Sells Tire Co. Stock

ATLANTA, GA., Feb. 3.—“Look out for a swindling tire salesman who goes by the name of Fred B. Steiner!” This is the substance of a warning sent to automobile and accessory dealers in Atlanta and throughout the state by J. W. Currie, vice-president of the Currie-Akers Tire Co., of Atlanta.

According to Currie, Steiner was employed by the Norwalk Tire Co. to travel Tennessee, working out of the Memphis office. Since then, however, he has not been heard from, though several dealers are said to have registered complaints against him. His game seems to be to sell \$50 worth of stock in the Norwalk Tire Co. and \$50 worth of tires at the same time. He collects half of this on the spot, Currie says, and afterwards probably destroys the order and contract. At any rate he seems to be pocketing all of the money he himself collects, and dealers are warned to be on the lookout for him.

Wins Suit Against Maibohm for Wages

RACINE, WIS., Feb. 2.—A default judgment has been entered in Circuit Court at Racine, Wis., in the sum of \$3,939.72 against the Maibohm Motors Co., formerly of Racine, now of Sandusky, Ohio, in favor of Lloyd McGinnis, a former salesman. The complaint said the company made a contract Oct. 16, 1917, to pay McGinnis \$400 per month or a commission of 2 per cent of the list price of each vehicle sold by him.

Up to June 25, 1918, it was claimed, McGinnis obtained orders for 100 run-

abouts and 290 touring cars, none of which were delivered. In the meantime the Maibohm plant at Racine was destroyed by fire and the company moved to Sandusky, Ohio. Because of the refusal of the company to appear in the Racine court, the jury returned a verdict for the plaintiff in the full sum demanded.

Cheyenne Establishes Tractor “Dead Line”

CHEYENNE, WYO., Feb. 5.—Tractors have become so numerous in the Cheyenne district that they are a nuisance in the city and the City Council is preparing to establish a “dead line,” beyond which the machines may not be operated within city limits. Tractors passing through the city will be restricted to certain thoroughfares and the heavier types will not be permitted in the city at all because of the damage inflicted to streets.

Georgia to Repeal Temporary Licenses

ATLANTA, GA., Feb. 3.—The repeal of a section of the new motor vehicle license law in Georgia permitting the use of temporary pasteboard license tags, will probably be asked by S. G. McLendon, Secretary of State, at the next meeting of the general assembly, because of the fact that the alleged abuse of this privilege by certain dealers and car owners bids fair to defraud the state out of several thousand dollars in motor vehicle license fees.

Mineral Oil Exports Increase in December

WASHINGTON, Jan. 30.—Mineral oil exports for December, 1919, totaled 249,595,359 gal., valued at \$33,227,066 as compared with 186,927,851 gal. valued at \$29,027,415 in December, 1918. The shipments for the calendar year 1919 totaled 2,492,754,397 gal., valued at \$343,776,385, an amount slightly less than the exports for the calendar year 1918. Gasoline exports for December, 1919, were 29,135,218 gal., as compared with 54,531,880 gal. in December, 1918.

ORGANIZE PLANE CO.

WASHINGTON, Jan. 30.—The Southern Aeroplane Co. has been organized at Fairmont, W. Va., to carry on sales and passenger transportation in West Virginia, Kentucky, Tennessee, Mississippi, Alabama and Louisiana. The company expects its first planes to be delivered in February and will use them in Louisiana and Alabama operating special taxi lines, carrying on aerial advertising, aerial photography, etc. The personnel is composed chiefly of ex-A. E. F. men, with Harrison B. Tucker, president; G. H. Barger, secretary; John J. Niles, vice-president, and H. R. Hall, treasurer.

Air Bill Undergoes Changes in Senate

Military Affairs Committee Gets Senator New's Measure for Amendments

WASHINGTON, Feb. 2.—The bill to create a Department of Aeronautics, introduced by Senator New and under consideration for several days by the Senate, has been returned to the Senate committee on military affairs for re-consideration. The bill was returned to the committee at the request of Senator New following amendments offered and accepted in the Senate.

Amendments offered and accepted include one to the effect that the Director of Aeronautics will not be a member of the presidential cabinet, and another which provides that the heads of the Division of Civil and Commercial Aeronautics, Division of Supplies and Division of Research will be appointed by the President and with the consent of the Senate instead of by the Director of Aeronautics. The provision giving the heads of these departments the rank of brigadier general was eliminated. Another amendment offered, but not acted upon because of the absence of a quorum, included the reduction of the salary of the Director of Aeronautics from \$12,000 to \$8,000.

Senator New's bill is the one introduced into Congress several months ago which would provide a Department of Aeronautics under a director; would have a separate military air service from that operated by the Army and Navy, and would have complete control of all aeronautics in the United States. A total appropriation of \$97,974,877 is asked, from which should be deducted \$4,350,000 now asked for by the Post Office Department and which could be supplied out of this.

Senator McKellar introduced an amendment to the bill, which would exclude the Post Office Department from its provisions and would allow the Post Office Department to operate as an entirely separate body. He described in detail how the Air Mail Service under the Post Office has been a conspicuous success, and stated that the people of the country are demanding not only the retention of the Air Mail Service but its extension.

In further explanation of his bill, Senator New declared that the present attitude of the United States toward aeronautics is absurd, and that Congress is adopting the same tone that it showed to Wright brothers and to Professor Langley. This country, he pointed out, spent \$1,000,000,000 for the aircraft industry, built up twenty-two factories during the war, trained 15,000 aviators and produced 11,000 airplanes of various types, with the result that to-day the industry is down to 5 per cent in productive capacity, but 900 of the trained fliers are in the Army, and no experimental work nor new airplanes have been developed.

Dismiss Reports of Gasoline Shortage

Bureau of Mines Declares Mexican Situation Favorable for Continued Output

WASHINGTON, Jan. 30—Reports current that the Mexican oil situation is unfavorable and is affecting the price of gasoline in the United States are regarded as exaggerated by the Bureau of Mines, Department of the Interior. This report has been based on the Mexican Government's interference with the development of oil wells in Mexico and with the appearance of salt water in several large Mexican wells, indicating that they have come to their natural end. While these facts are true, they are not regarded as important to the price of gasoline in this country.

Until this month the Mexican Government has recently interfered with the development of oil wells by American companies because of the nationalization plan which President Carranza has fostered. Within the last several days, however, the drastic regulations have been temporarily suspended, and American concerns are now permitted under temporary terms, to drill new wells, relieving the Mexican situation considerably, as the new development will undoubtedly make up for the decline and exhaustion of these wells which have recently come to their natural end. The appearance of salt water within the last year in several of the largest wells, in one, for example, which has flowed a total of 100,000,000 bbl. of oil, is another important factor in Mexican production, but which will be easily offset by the new development.

Inasmuch as the total Mexican import of petroleum is less than 20 per cent of the production in the United States, and also because the Mexican oil contains comparatively small amounts of gasoline, it is not regarded as likely that the Mexican situation can have any material effect on the price of gasoline in this country, unless conditions in Mexico should become considerably more serious than they are at the present time. There would only be an effect on the price of gasoline in the United States if there should be some such combination, states the Bureau of Mines, as a considerable reduction in the Mexican imports, together with a critical condition in the domestic supply of gasoline. The principal effect of the conditions in Mexico will be upon fuel oil, which constitutes a large part of the Mexican crude.

New Wisconsin Sales Record Now Effective

MILWAUKEE, Feb. 2—A new requirement of the Wisconsin motor code which has just gone into effect and is causing much extra work for manufacturers as well as dealers is Section 1636-48 of the statutes, an enactment of the 1919 session of the Legislature, reading:

"It is hereby made the duty of every manufacturer of or dealer in motor vehicles in this State to make a monthly report to the Secretary of State on blanks to be prescribed and furnished by the Secretary of State, showing information as follows:

"The date of the sale of each motor vehicle sold, date of delivery of same, the name and address of the party to whom sold, maker's name of motor vehicle, motor number, style of vehicle, motive power, horsepower, new or secondhand motor vehicle."

Dort Plans to Make Closed Car Bodies

KALAMAZOO, Mich., Feb. 2—Dort Motor Car Co. of Flint has purchased the plant of the Lull Carriage Co. in this city and will make it the nucleus of a big body-building plant for the manufacture of sedan and coupé bodies. Production will start as soon as the present plant has been remodeled and will be increased as rapidly as additions can be constructed.

MAKES CAR EQUIPMENT

CHICAGO, Feb. 5—The Brasco Mfg. Co., manufacturers of metal moldings, etc., has entered the automotive field with a line of bumpers, channels, welded tubing and other similar products, according to a statement recently made by A. Heat.

Army Opens Transport School at Camp Jesup

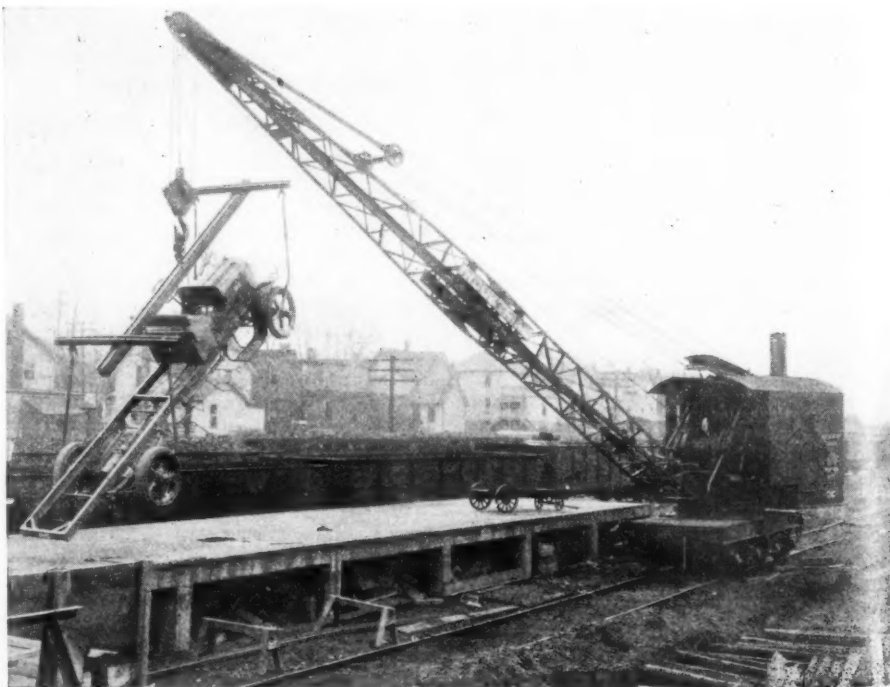
ATLANTA, GA., Jan. 30—The largest school of its kind in the United States Army was opened last Saturday at Camp Jesup, in the suburbs of Atlanta, when 630 military students and 83 instructors reported to the Camp Jesup Motor Transport School, and the capacity of 900 students and 100 instructors is expected to be reached before the middle of February.

Instruction will be given in 16 different courses, averaging 15 weeks each, and 150,000 sq. ft. of floor space and \$1,000,000 worth of equipment and tools have been turned over to the school. As a by-product of the instruction work 15 trucks and 20 motorcycles will be overhauled, rebuilt and turned out for service each month.

Similar schools will be established at San Antonio and El Paso, Texas, and another is already in operation at Camp Holabird, Md. The War Department plans not only to train men for the peace time needs of the Army and build up a reserve corps in the event of war, but is turning out mechanics of as great worth as those coming from the large motor manufacturing plants.

Highly rated men will be offered academic courses in the technological schools and others will be retained as instructors in these schools. Still others will be assigned to actual upkeep work in the various camps throughout the country.

Loading GMC Trucks at Pontiac



One of the features of the GMC truck plant at Pontiac is the method of loading trucks for shipment. This has been met by the installation of a gigantic crane which picks up the trucks, swings them around and deposits them in coal cars—often the only type of cars available. After the trucks have been anchored securely, all is ready for the trip to destination. This efficient method helps GMC dealers throughout the country to receive allotments on time.

Stanswell to Make \$2,500 Canadian Car

TORONTO, Feb. 6—The Stanswell Motors, Ltd., has been incorporated by Canadian financiers, to build a Canadian-designed car which will sell for about \$2,500 f.o.b. factory. The plant will be located at Amherstbergh, Ont., and will get into production by about March 15. A five-passenger touring car with stream-line body and 118-inch wheelbase will be the only model at the outset of operations. Specifications include Warner transmission, Timken axles and bearings, 55 h.p. Red Seal Continental engine, Arnold squeakless ball bearing springs and other standard equipment.

To Spend \$30,000,000 on Iowa Highway Work

DES MOINES, Feb. 4—Iowa will spend \$30,000,000 for good roads in 1920 according to a statement made this week by Fred R. White, of Ames, chief engineer of the state highway commission. According to White this amount of money will be apportioned upon the following work 355.85 miles of road paving, 231 miles of road graveling, 1334 miles of earth roads graded and drained and additional work on 2000 miles of primary roads calling for federal aid. Paving contracts let thus far call for concrete and brick.

Omaha Park Co. Makes Ten Test Tractors

OMAHA, NEB., Feb. 5—Omaha Park Tractor Co., Omaha, has been incorporated for \$100,000 to manufacture tractors. Ten machines are being made as a test at the Omaha Structural Steel Works. Officers of the company are B. C. Pflug, president and treasurer; T. W. Blackburn, vice-president, and Arthur Parsons, secretary and general manager.

TO INCREASE PRODUCTION

CLINTONVILLE, WIS., Feb. 2—The Topp-Stewart Tractor Co. of Clintonville, Wis., at its annual meeting voted to make a new issue of \$250,000 of 8 per cent preferred stock to purchase raw materials and otherwise finance an increased production of its four-wheel-drive tractor. The 1919 output amounted to 100 machines, and a schedule of 350 to 400 machines, or an average of not less than one a day, was set for 1920. Edwin T. Boland, formerly general superintendent Kissel Motor Car Co., Hartford, Wis., recently took charge of the Topp-Stewart plant as works manager.

INCREASE HERCULES STOCK

CANTON, OHIO, Jan. 31—Papers have been filed increasing the authorized capital of the Hercules Motor Manufacturing Co. from \$500,000 to \$700,000.



Mack Carries World's Largest "Gas" Tank

This gasoline tank on a motor truck chassis is said to be the largest in the world. The Mack truck chassis not only carries the tank, but pulls another of 1900 gallons capacity that is mounted on a trailer. The tanks are used to transport casinghead gasoline, which is so explosive that the railroads will not transport it. It is mixed with a less volatile gasoline before marketing. When the truck is on the road filled with casinghead gasoline the difference in temperature between the gasoline and the air (due to the evaporation of the gasoline) is so great that the tanks become coated with frost.

Financial News

The Star Rubber Co. will increase its capitalization to \$4,000,000.

Spacke Machine & Tool Co. is offering \$500,000 of 8 per cent cumulative preferred stock.

National Tire & Rubber Co. stockholders at a recent meeting approved the reorganization plans under which the capital of the company will consist of \$1,000,000 of 7 per cent preferred stock and 75,000 shares of no par common.

International Motor Truck Corp. has declared initial dividends of \$3.50 a share on the first preferred and \$3.50 a share on the second preferred stock, both payable March 15 to stock of record Feb. 28. These dividends cover accruals of preferred dividends from Sept. 1, 1919, to March 1, 1920.

DOUBLES CAPITAL STOCK

MANITOWOC, WIS., Feb. 2—The Wisconsin Aluminum Foundry Co. of Manitowoc, Wis., has increased its capital stock from \$100,000 to \$200,000 to enlarge its plant and business. By the retirement of several stockholders the ownership is now vested in Bruno Dalwig, David Balkansky and A. Schwartz.

Jacquet Motor Corp. to Make New Racer

Will Also Build Roadster to Sell at \$3,500 to \$4,000—Will Make 500 in 1920

BELDING, MICH., Jan. 31—The Jacquet Motor Corp., headed by A. J. Jackson, formerly with Napier, Pierce-Arrow and the Republic Truck Co., will manufacture a racing car and a four-cylinder roadster in Belding. The corporation, capitalized at \$100,000, paid in, has taken over the plant of the Belding branch of the Grand Rapids Brass Co. and will begin work immediately, with the idea of being in production inside of 60 days.

L. W. Wilson, assistant superintendent at Plant 2 of the Timken-Detroit Axle Co., will be general manager of the new plant, and Charles Marquet, manager of the American Motors Co. of Battle Creek, will be production manager and will have charge of the experimental work.

The concern will build its own chassis and will use an engine manufactured by the Wisconsin Motor Manufacturing Co. Bodies built in Belding will be used in the new roadster, which will be along the same lines as the Stutz. An organization meeting will be held next week, and erection of an additional factory building on land adjoining the present plant site will be begun immediately.

The new car will be built to sell for between \$3,500 and \$4,000, the price to be fixed at the meeting next week. From 300 to 500 cars is the scheduled production for 1920.

United States Trade Balance for 1919 Is \$4,017,744,265

Exceeds Balance of 1918 by \$899,869,430.—In Year Europe Bought \$5,185,980,350 and Sold \$750,569,784.—Asia Imports Exceed Exports

WASHINGTON, Feb. 3.—The vast balance of foreign trade in favor of the United States is shown by figures just released by the Bureau of Foreign & Domestic Commerce, indicating that in December, 1919, the United States exported commodities valued at \$681,715,999 as compared with imports of \$380,710,323 in the same month. The proportion is slightly less in 1918 when the exports totaled \$565,886,112 and the imports were but \$210,886,517. The exports for the calendar year 1919 totaled \$7,922,150,592, while the imports amounted to \$3,904,406,327.

The greatest import business for De-

cember was transacted with Asia, from which continent we imported goods valued at \$112,725,789 and the greatest export business was to Europe, which purchased merchandise valued at \$432,350,273 from us.

North America was the largest seller to the United States for the calendar year 1919, with a total of \$1,157,771,286, while Europe was the greatest buyer, with a total of \$5,185,980,350.

The disparity between the commerce of this country and Europe is easily noted by comparing this last figure with the total imports from Europe amounting only to \$750,569,784.

N. A. C. C. Urges Need of Freight Service

NEW YORK, Feb. 5.—In a recent bulletin to its members, the National Automobile Chamber of Commerce advises automobile manufacturers and dealers to insist that the railroads serving them provide wide door openings when building or repairing box cars. This need was brought to the attention of the Railroad Administration at the traffic meeting of the Chamber held in Detroit, Jan. 29.

This also will be brought to the attention of all the lines independently, and it is believed that the large volume which automobile traffic has attained (300,000 carloads in 1919), and the amount of business lost to the carriers through lack of cars and consequent driveways (40,000 carloads in 1919), will add considerable force to the request.

The N. A. C. C. bulletin says: "Members and their dealers should urge this point continuously on all railroad officials and employes with whom they come in contact."

The Railroad Administration was also urged to relieve the critical shipping conditions. The effect on labor and business of such conditions in the automobile and allied industries was emphasized, as was also the great loss of revenue to carriers through the driving of thousands of carloads of automobiles over the roads instead of shipping them by freight. Particular stress was placed on making directors of the western and southwestern regions realize the importance of returning automobile cars to the manufacturing territory.

AWARD FOUNDRY CONTRACTS

RACINE, WIS., Feb. 2.—The J. I. Case Plow Works Co. of Racine, Wis., has awarded contracts for two big foundries to serve its Wallis tractor division. The new gray iron shop will be 130 x 360 ft. and the new malleable foundry, 151 x 300 ft. The cost will be \$265,000.

Show Four Panhards in Private Exhibit

NEW YORK, Feb. 5.—For the first time since 1913 Panhard cars are being exhibited here. Four of the Panhard-Levassor jobs are being shown in the former cafe of the Waldorf-Astoria Hotel. The cars arrived a few days ago from France.

During the war the factory was engaged in making cars and trucks for the army and more than 3000 of its small 16 h.p. models were made for the use of army officers. A chassis of this model and three closed body types form the exhibition. They are all 1920 models.

Geo. A. Chailliey arrived here from France last month to establish agencies for the Panhard cars. No definite price has been fixed for the closed cars, it is understood, but they will be from \$10,000 to \$12,000.

TO BUILD FABRIC MILL

PROVIDENCE, R. I., Feb. 2.—F. L. Jenckes, head of the Jenckes Spinning Co. of Pawtucket, and several associates in industry will build a large automobile tire-fabric plant near Montreal. The mill will cost approximately \$1,000,000 and will employ 1000 operatives. It will be operated upon American production systems.

STEWART CHANGES

BUFFALO, Jan. 26.—Charles C. Craig, for more than three years district salesmanager of the Stewart Motor Corp., has been promoted to the position of salesmanager, effective March 1. The vacancy was caused by the resignation of W. J. Male, who had been appointed Stewart distributor for Buffalo. Burt R. Barr, advertising manager for the past two years, has been promoted to assistant salesmanager.

Lawson Airplane Co. to Increase Output

MILWAUKEE, Feb. 5.—Plans are being made for the expansion of the Lawson Airplane Co. South Milwaukee plant early this spring, which when completed will include the Lawson company among the largest aircraft concerns in this country.

Production of ten machines to be completed this spring has begun. Due to the large size of the Lawson machine plant, it is the belief of Lee Wallace, chief engineer, that the production figures are conservative enough to secure the best results in workmanship and design.

The C-2 type, Wallace says, probably will be the smallest of the Lawson machines, and it has been termed "the baby."

In addition to the South Milwaukee plant, the Lawson company occupies several plants around Milwaukee where metal and wooden parts are made.

New York Service Men Hear Willys Manager

NEW YORK, Feb. 6.—Members of the Automotive Service Association of New York turned out in large numbers, Tuesday night, to hear Henry M. Holt, service manager of the Willys Overland, Inc., New York, discuss the subject "Routing a Job Through the Service Station."

Holt operates his service station on the flat rate system entirely and he pointed with pride to his record of more than 2200 jobs without a complaint as indication of his judgment in adopting this system. Holt said he believed that the time and material method of charging for service is rapidly doomed to discard.

The meeting was the first of a series that is to continue during the early spring at which men prominent in service business will be heard in discussions of problems.

INCORPORATE TIRE CO.

KENT, OHIO, Jan. 31.—The Franklin Tire & Rubber Co. has been chartered with a capital of \$101,000 to manufacture tires and tubes. The incorporators are W. A. Cluff, J. H. Deihl, H. W. Sidnell, D. M. Mason and J. G. Miller.

REPAIR BURNED PLANT

OSHKOSH, WIS., Feb. 2.—The H. C. Doman Co., Oshkosh, Wis., manufacturer of vehicle and marine engines, is making repairs costing \$15,000, made necessary by a fire in its cupola building on Jan. 17.

INCORPORATE GEAR CO.

MILWAUKEE, Feb. 2.—Articles of incorporation have been filed by the Milwaukee Gear Co. The capital stock is \$75,000 and the objects are to manufacture and deal in metal products, specializing in gears, transmissions, etc. The incorporators are Emil G. Bonsig, Henry E. Olsen and Martin Olsen.

Table Showing United States Foreign Trade in 1919

Imports from: Grand Divisions—	Month of December		12 Months Ended December	
	1919	1918	1919	1918
Europe	\$97,224,066	\$25,667,765	\$750,569,784	\$318,121,271
North America.....	85,131,848	65,791,568	1,157,771,286	974,615,243
South America.....	55,934,409	43,518,026	687,525,388	610,931,072
Asia	112,725,789	48,580,749	1,041,444,129	853,374,521
Oceania	15,431,893	23,062,808	154,908,094	188,664,141
Africa	14,262,318	4,265,601	112,187,646	85,506,462
Total.....	\$380,710,323	\$210,886,517	\$3,904,406,327	\$3,031,212,710
Principal countries—				
Austria-Hungary	\$477,402	\$46,445	\$2,390,973	\$97,323
Belgium	1,700,756	8	7,700,100	13,964
France	16,995,600	3,419,399	123,871,409	59,509,854
Germany	2,480,523	102,842	10,624,229	317,706
Italy	7,239,453	1,507,504	59,048,446	24,340,022
Netherlands	7,533,809	577,899	75,506,503	8,824,419
Norway	652,345	845,555	7,371,249	2,015,851
Russia in Europe.....	87,074	1,460,095	2,953,480	6,784,603
Spain	5,028,511	2,454,811	49,391,903	18,488,289
Sweden	2,122,628	535,700	13,825,982	5,935,490
Switzerland	4,695,593	1,391,666	27,687,818	16,882,742
United Kingdom.....	42,380,056	8,832,546	309,189,265	148,614,815
Canada	48,067,457	35,100,718	494,693,869	451,695,009
Mexico	15,138,055	13,797,141	148,926,376	158,643,427
Cuba	15,804,184	11,126,268	418,610,263	278,635,027
Argentina	17,013,606	9,928,788	199,158,401	228,388,215
Brazil	17,910,996	6,221,563	233,570,620	98,038,132
Chile	7,202,267	13,439,372	82,442,364	166,082,920
China	14,723,338	6,996,589	154,153,751	110,970,969
British East Indies.....	33,749,842	16,482,332	322,147,773	299,108,107
Japan	42,723,026	21,739,086	409,853,213	301,943,058
Australia and New Zealand.....	6,701,991	14,098,891	79,489,432	94,780,800
Philippine Islands.....	7,957,382	8,111,547	66,289,336	85,926,717
Egypt	5,829,848	636,772	39,628,681	28,850,475
Exports to: Grand divisions—				
	1919	1918	1919	1918
Europe	\$432,350,273	\$362,173,660	\$5,185,980,350	\$3,858,697,768
North America.....	134,763,992	110,653,512	1,295,812,471	1,325,486,350
South America.....	31,221,392	27,644,949	442,127,329	302,709,610
Asia	62,800,114	45,120,702	703,667,109	445,501,200
Oceania	12,638,570	13,301,023	195,894,170	157,494,998
Africa	7,941,658	6,992,266	98,669,163	59,197,619
Total.....	\$681,715,999	\$565,886,112	\$7,922,150,592	\$6,149,087,545
Principal countries—				
Austria-Hungary	\$4,932,387	.....	\$42,211,564	.....
Belgium	30,015,897	\$19,090,968	377,876,308	\$154,649,338
Denmark	11,137,020	5,347,571	163,965,478	11,353,845
France	63,462,446	67,314,720	893,368,996	931,199,774
Germany	17,297,077	.....	92,761,314	.....
Greece	3,852,144	435,059	42,883,610	4,346,471
Italy	39,385,942	49,461,418	442,676,842	492,174,547
Netherlands	33,692,178	3,842,384	255,134,440	11,369,269
Norway	7,438,161	2,343,892	135,134,594	36,137,464
Russia in Europe.....	6,177,303	362,149	27,757,513	8,902,449
Spain	9,531,701	19,018,513	102,819,694	69,188,733
Sweden	4,875,246	2,836,024	133,063,131	15,674,108
United Kingdom.....	192,216,230	185,616,243	2,279,178,048	2,061,292,543
Canada	71,918,763	72,724,120	734,267,286	886,877,584
Central America.....	6,315,864	3,890,813	55,642,956	40,899,065
Mexico	12,384,558	7,545,035	131,451,901	97,788,736
Cuba	35,147,976	19,347,660	278,391,222	227,156,047
Argentina	11,061,790	11,318,027	155,968,390	105,104,548
Brazil	5,779,934	3,011,383	114,656,309	57,391,417
Chile	3,070,544	7,532,903	53,471,688	66,404,300
China	6,110,225	3,392,834	105,514,962	52,570,579
British East Indies.....	7,447,151	5,789,925	81,514,358	51,354,855
Japan	42,704,770	25,103,748	366,364,593	273,774,685
Russia in Asia.....	867,087	3,777,923	54,678,672	8,433,069
Australia and New Zealand.....	9,311,397	10,247,172	123,255,644	101,824,158
Philippine Islands.....	3,073,739	2,854,422	70,310,262	52,975,672
British Africa.....	5,176,182	4,054,437	59,452,756	43,758,997

FULLER MFG. CO. TO BUILD

KALAMAZOO, Mich., Feb. 2—Fuller & Sons Manufacturing Co. have let a contract for a new four-story building, 60 by 156, to connect the two modern buildings now in use. The addition will give them a building 60 by 434 ft. The company, which employs 650 persons, is engaged in the manufacture of transmissions and constantly increasing business necessitated the increase in building space and equipment.

BUILDS AT BATTLE CREEK

BUCHANAN, MICH., Jan. 31—Clark Equipment Co. will build a factory to manufacture Clark axles at Battle Creek. The local plant will be continued but the lack of housing facilities for employees of the rapidly growing institution necessitated the selection of a factory site in another city.

TUSCORA PLANT READY

NEW PHILADELPHIA, OHIO, Jan. 30—Manufacture of tires by the Tuscara Rubber Co., near here, is soon to be started with 400 employees.

TO BUILD MACHINE SHOP

MILWAUKEE, Feb. 2—The Doelger & Kirsten Co., Milwaukee, manufacturer of metal-working machinery, will build a two-story machine shop addition, 90 x 200 ft.

TO BUILD BODY PLANT

LUDINGTON, MICH., Jan. 31—Frank Monroe of Indianapolis, Ind., has closed a contract with a local bond committee, and a \$500,000 body plant will be located here by Monroe. Bodies made at the local plant will be for the Nash Motors Co. of Kenosha, Wis. Monroe now manufactures bodies for the Oakland Motor Car Co., at Pontiac, and for Monroe cars at Indianapolis. The city of Ludington voted \$100,000 for bonds for the factory, which will be paid to the Monroe company after it as paid out \$2,500,000 in wages in this city.

TO OPEN TRUCK PLANT

BELLEVUE, OHIO, Jan. 31—The Collier Motor Truck Co. is preparing to begin operations in its new plant here.

OPENS GRAY IRON SHOP

MILWAUKEE, Feb. 2—The Motor Castings Co. of Milwaukee, organized last summer, is placing its new gray iron shop at Fifty-sixth and Greenfield avenues, in West Allis, in operation this week. The plant represents an investment of \$125,000 and will specialize in castings for the automotive industries.

PLAN BIG FOUNDRY

MILWAUKEE, Feb. 2—The American Foundry Co. of Milwaukee is in process of organization and intends to build a \$75,000 gray iron foundry for the manufacture of cylinder castings, pistons, etc., on Park Street. The first building will be 120 x 180 ft.

**Current News of
Factories****Notes of New Plants—
Old Ones Enlarged****FORM NEW BODY COMPANY**

KALAMAZOO, Mich., Feb. 2—The American Carriage Co.'s plant has been taken over by a syndicate of local capitalists headed by C. C. Bobb, president and general manager, which will manufacture automobile tops and bodies. The company will have a capitalization of \$150,000 and production will start as soon as the concern formally takes over the two carriage company buildings, which provide a space of 40,000 sq. ft.

TO MAKE FOUR-WHEEL DRIVE

FOX LAKE, WIS., Feb. 2—The Six-Wheel Truck Co., organized several months ago at Fox Lake, Wis., has completed experimental work and is now buying equipment for a factory which will make 2-ton trucks employing a double wheel rear drive system equipped with an automatic locking differential. The company is capitalized at \$60,000. F. N. Pettegrew of Fox Lake is president. H. H. Kirkpatrick of Chicago has become secretary and treasurer.

RELOCATE TIRE OFFICE

NEW YORK, Feb. 5—The Henderson Tire & Rubber Corp., has completed arrangements for the location of its general sales office in the new National Association building, 23 West Forty-third street on or about Feb. 15. It will be in charge of Harold W. Harwell, sales-director.

TO BUY SALESCRAFT CO.

NEW YORK, Jan. 30—The American Business Corp. has completed negotiations to take over the Salescraft Co. of New York, manufacturers of automobile equipment. This subsidiary will be operated under the name of the Automotive Division of the American Business Corporation.

ENLARGE SOUTHERN PLANT

ATLANTA, GA., Jan. 30—One of the important developments in automobile industries in the Southeast in the past several weeks is the announcement of the Southern Truck and Car Corp., of Greensboro, N. C., that the company will build additional units to its present plant for the manufacture of passenger and pleasure cars and commercial motor trucks. Recently the company was recapitalized and stock increased from \$500,000 to \$1,000,000, the purpose being to expand and increase its capacity during the present year. J. A. Norford is the president and general manager of the new corporation.

DELAWARE INCORPORATIONS

WILMINGTON, DEL., Feb. 2—The following corporations have been chartered under the laws of Delaware:

Eastern States Motors Co. of Wilmington, with a capital of \$1,000,000, to manufacture automobiles, trucks, etc. The incorporators are W. F. O'Keefe, George G. Steigler and E. E. Aberle, all of Wilmington.

Standard Rim Corp. of New York, with a capital of \$250,000, to manufacture omnibuses, etc. The incorporators are Felix Spatzner and H. F. MacFarland, of New York, and Matthew Roeney, of Long Island, N. Y.

Hyve Motor Sales Corp., Wilmington, with a capital of \$500,000, to manufacture automobiles, etc. The incorporators are T. L. Croteau, M. A. Bruce and S. E. Dill, all of Wilmington.

Associated Stores Corp., with a capital of \$30,000,000, to manufacture tires, etc. The incorporators are T. L. Croteau, M. A. Bruce and S. E. Dill, all of Wilmington.

The Glazier Headlight Corp., of Wilmington, with a capital of \$3,300,000, to manufacture headlights, etc. The incorporators are T. L. Croteau, M. A. Bruce and S. E. Dill, all of Wilmington.

Grohman Motor Manufacturing Co., Inc., with a capital of \$500,000, to manufacture motors, motor trucks, etc. The incorporators are Frederick W. E. Grohman, Oliver R. Derr and John S. Derr, of East Greenville, Pa.

Certificates have been filed making changes of name as follows:

Akron Tire Co., Inc., to Akron-Overland Tire Co., Inc., and increasing the capital from \$10,000,000 to \$10,750,000.

Rochester Tire & Rubber Co. to Power-ton Tire & Rubber Corp., of Buffalo, N. Y.

Standard Axle Corp., of Wilmington, to Mack Corp., and increasing the capital from \$2,000,000 to \$3,000,000.

Certificates have been filed increasing capital as follows:

Delaware Motor Sales Co., of Wilmington, from \$130,000 to \$1,000,000. This company is the local distributor for the Cadillac car and is backed by du Pont interests.

National Shuttle Valve Motors Co., of Cleveland, Ohio, from \$5,000,000 to \$10,000,000.

WILL MAKE FIXTURES

MILWAUKEE, Feb. 2—The National Metal Products Co. of Milwaukee has been incorporated, with a capital stock of \$35,000, to manufacture and wholesale automotive equipment, specializing in electrical fixtures. Louis L. Cohen, Walter Miller and Paul E. Waldvogel are backing the enterprise.

TO MAKE STEERING GEAR

SUPERIOR, WIS., Feb. 2—Articles of incorporation have been filed in behalf of the Safety Steering Gear Co. of Superior, Wis. The capital stock is \$100,000 and the purpose is to manufacture and market a new type of steering system for motor vehicles and tractors.

H. B. Harper Elected President of N. A. D. A.

CHICAGO, Feb. 2—The following official board of the National Automobile Dealers' Association was unanimously elected upon report of the nominating committee: President, Harry B. Harper, Philadelphia; first vice-president, P. H. Greer, Los Angeles; second vice-president, W. G. Brace, Kansas City; treasurer, F. W. A. Vesper, St. Louis.

Directors for one year, R. W. Powers, Providence; J. A. Graham, Minneapolis; Thomas Botterill, Denver. Directors for two years, C. D. McCutcheon, Atlanta; Thomas J. Hay, Chicago; C. B. Weaver, San Francisco. Directors for three years, A. E. Mitzel, Canton; W. A. Woods, New York; J. D. Wray, Shreveport; H. D. Austin, Seattle.

Before adjournment the association, through H. N. Cartinhour, presented Retiring President F. W. A. Vesper with a valuable traveling bag as a testimonial of regard.

FIRESTONE CHANGES

AKRON, Jan. 30—Promotion of four sales executives has been announced by the Firestone Tire & Rubber Co.

E. W. BeSaw, who has been Western salesmanager, is made general salesmanager succeeding A. G. Partridge, who recently was elected vice-president in charge of sales.

L. G. Fairbank, former manager of the Eastern division, becomes vice-president and manager of the Firestone Steel Products Co. F. K. Starbird, of Minneapolis, and J. E. Mayl, of Boston, district sales chiefs, have been called to Akron to take the divisions formerly directed by BeSaw and Fairbank.

NAMED SERVICE MANAGER

TRAVERSE CITY, Mich., Feb. 2—J. E. Kilpatrick, a lieutenant in the Motor Transport Service, has been made service manager for the Napoleon Motors Co. The officials in casting about for the right man to take charge of their service department selected Kilpatrick on his record with the Government forces.

PRODUCTION MANAGER DIES

DETROIT, Feb. 2—J. L. Vette, production manager of the Hudson Motor Car Co., died of pneumonia following influenza last week. He was widely known in the industry and his death came as a distinct shock.

NAMED DISTRIBUTER

WICHITA, KAN., Feb. 4—Charles G. Mills has been named distributor in Kansas for the G. O. tractor, and will make his headquarters in Wichita. He was formerly a member of the G. O. salesforce. Mills is a graduate of the Sheffield Scientific School at Yale and has had considerable experience in the automobile business. For several years he was assistant professor of engineering at Cornell University and has served as instructor at several tractor schools.

Men of the Industry

Changes in Personnel and Position

Howard S. Lyon, engineer of the Cutler-Hammer Manufacturing Co. of Milwaukee, has become associated with the Fred E. Castle Co., Detroit, distributors for the United States of the C-H gear shift.

K. E. Rogers has resigned as purchasing agent of the automotive division, Standard Steel Car Co., Pittsburgh, to become purchasing agent of the New Castle Rubber Co. of New Castle, Pa.

Harry W. Bouck, formerly connected with the service publicity department of the J. I. Case Plow Works Co., Racine, Wis., has been appointed assistant advertising manager for that company.

K. W. Swigert, who has long been connected with automobile production in the Middle West, has been appointed general factory manager of the Oakes Co., Indianapolis, maker of automotive cooling fans and special metal stampings.

K. P. Drysdale has become associated with Theodore F. MacManus, Inc., Detroit. He was formerly with the Cadillac Motor Car Co.—two years as assistant salesmanager and 10 years as advertising manager.

C. H. Mayer, who has been representing the International India Rubber Corporation on the Pacific Coast, has been appointed assistant salesmanager of the company with headquarters at the factory in South Bend, Indiana.

SIGN WITH OLDFIELD

NEW YORK, Jan. 30—H. A. Grubb, a tire industry executive of wide experience, has been appointed vice-president and acting general manager of the Oldfield Tire Co., according to a recent announcement by Barney Oldfield, president. Other additions to the Oldfield organization include O. C. Wagner, credit manager, and C. L. Reely, advertising manager and assistant salesmanager.

NAMES COAST DEALERS

INDIANAPOLIS, Feb. 2—The Weidely Motors Co., Indianapolis, makers of Weidely "Bulldog" engines for automotive power, will be represented on the Pacific Coast by the Adam-Hill Co., San Francisco, according to an announcement just made by B. F. Kelly, director of sales. The Adam-Hill Co. is composed of P. M. Adam and F. Leroy Hill.

Du Pont Hold on G. M. C. Probably Strengthened

NEW YORK, Feb. 5—The annual report of the E. I. du Pont de Nemours Co. for 1919 is expected to show that the company's investment in General Motors Corp. stock now represents about 30 per cent of the common capitalization, says the *Wall Street Journal*.

This would mean that the big Wilmington powder company holds approximately 440,000 of the 1,480,152 shares of General Motors common outstanding.

The du Pont report for 1918 showed that the company held 27.6 per cent interest in the common stock of the General Motors Corp.

HEADS SERVICE COMPANY

DETROIT, Feb. 4—L. L. Williams, formerly of the Lang Body Co., Cleveland, has become managing executive of the Automotive Service Co. of Cleveland, an organization handling purchasing, engineering, production, sales and inspection problems for automotive concerns.

C. E. WILLIAMS DIES

NEW YORK, Jan. 31—C. E. Williams, general salesmanager of the Sanford Motor Truck Co. of Syracuse, died suddenly on Jan. 29 at Rochester, N. Y., following a short attack of pneumonia.

Williams had been with the Sanford company but two months, having gone to that company from the Selden Truck Corp., with whom he had been associated as salesmanager for a long time.

While a comparatively young man, Williams had enjoyed an enviable record in the selling end of the motor truck industry. Prior to his connection with the Selden corporation he was affiliated with the sales department of the Federal Motor Truck Co. of Detroit.

DISTRIBUTES STANWOODS

DENVER, Jan. 30—The Bencol Rubber Co. has been appointed Colorado distributor for the Stanwood Rubber Company products.

RETAINS OFFICIALS

JEANETTE, PA., Jan. 30—New officers of the Pennsylvania Rubber Co., elected at the annual meeting Jan. 28, are: Herbert DuPuy, chairman of the board; H. Wilfred DuPuy, president; Charles M. DuPuy, vice-president; Seneca G. Lewis, vice-president and general manager; George W. Daum, assistant general manager; A. H. Price, treasurer; George W. Shively, secretary; James Q. Goudie, general sales director; C. G. Merrill, assistant treasurer; H. H. Salmon, purchasing agent.

OHIO DISTRIBUTER NAMED

COLUMBUS, OHIO, Jan. 31—The Hatfield-Travener Auto Sales Co. is the name of a new concern opened here as central Ohio distributor for the Jones Six and the Sayer Six.

Calendar

SHOWS

- Feb. 9-13—Charlotte, N. C. Automobile Show, Charlotte Automobile Trade Assn. Lee Folger, Chairman, Show Committee.
- Feb. 9-14—Cedar Rapids, Ia. Annual Automobile Show, Linn County Motor Trades Bureau, Auditorium. W. J. Hutchings, Chairman, and H. M. Davis, Secretary.
- Feb. 9-14—Poughkeepsie, N. Y. Annual Automobile Show. Poughkeepsie Auto Club. Armory, George A. Coleman, Manager.
- Feb. 9-14—Salt Lake City. Annual Automobile Show. W. D. Rishel, Manager.
- Feb. 9-14—Nashville, Tenn. Nashville Automobile Trade Association.
- Feb. 10-13—Fargo, N. D. Barry Bldg. Fargo-Moorehead Automotive Trade Assn. H. L. Wilson, Director.
- Feb. 10-15—Quincy, Ill. Annual Automobile Show.
- Feb. 11-14—Mason City, Ia. Sixth Annual Automobile Show, Mason City Automobile Assn., Armory.
- Feb. 13-23—San Bernardino, Cal. Automobile Show, Tenth Annual National Orange Show. Milton Standish, Secretary.
- Feb. 14-21—New Castle, Pa. Annual Automobile Show, Lawrence County Automobile Trades Assn. J. B. Foster, Manager.
- Feb. 14-22—San Antonio, Tex. Automobile Show. San Antonio Automobile Trade Assn. W. A. Williamson, Manager.
- Feb. 16-21—Des Moines, Ia. Annual Automobile Show. Des Moines Automobile Dealers' Assn. Ford Factory, Dean Schooler and C. G. Van Vliet, Manager.
- Feb. 20—Cleveland, Cleveland Section S. A. E., Hotel Statler.
- Feb. 21-28—San Francisco. Fourth Annual Automobile Show. Exposition Auditorium. Motor Car Dealers' Assn. G. A. Wahlgreen, Manager.

- Feb. 21-28—Louisville, Ky. Twelfth Annual Exhibition. Louisville Automobile Dealers' Assn. First Regiment Armory.
- Feb. 23-27—Reading, Pa. Annual Automobile Show, Reading Automobile Trades Assn., Auditorium. N. S. Jorgenson, Manager.
- Feb. 23-28—Elmira, N. Y. Elmira State Armory. Elmira Automobile Club. H. S. Bryan, Manager.
- Feb. 23-28—Springfield, Ohio. Annual Automobile Show, Springfield Automobile Trades Assn., Memorial Hall. W. E. Stevens.
- Feb. 23-28—Portland, Ore. Truck Show. Armory. Dealers' Motor Car Assn. M. O. Wilkins, Manager.
- Feb. 23-28—Portland, Ore. Car Show. Hippodrome Building. Dealers' Motor Car Assn. M. O. Wilkins, Manager.
- Feb. 23-28—Grand Rapids, Mich. Motor Car Show. Furniture Exposition Building. M. D. Elgin, Manager.
- Feb. 23-28—Duluth, Minn. Automobile Show. Duluth Auto Trades Assn. W. F. Daly, Director.
- Feb. 28-March 6—York, Pa. Annual Automobile Show, York County Dealers' Assn., Overland-Harrisburg Garage. R. A. Anderson, Manager.
- Mar. 1-6—Springfield, Mass. Annual Automobile Show. Auditorium. Springfield Automotive Dealers' Assn. Robert H. Clark, Manager.
- Mar. 1-6—St. Joseph, Mo. Annual Automobile Show. St. Joseph Automobile Show Assn. Auditorium. John Albus, Manager.
- Mar. 1-6—Grand Rapids, Mich. Truck Show. Furniture Exposition Bldg. M. D. Elgin, Manager.
- Mar. 1-7—Springfield, Mass. Annual Automobile Show. Springfield Automobile Dealers' Assn. Harry Stacy, Secretary.

- Mar. 1-8—Seattle. State Armory. Motor Car Dealers' Assn. William J. Coyle, Manager.
- Mar. 2-6—Springfield, Ill. Annual Automobile Show. Springfield Auto Dealers' Assn. John Brodhead, Manager.
- March 3-6—Clinton, Ia. Annual Automobile Show, Clinton County Automobile Dealers' Assn., Coliseum. Harry G. Finch, Manager.
- March 6-13—New York, N. Y. Second Annual Aeronautical Exposition, Manufacturers' Aircraft Assn., Inc., 71st Regiment Armory. Walter Hempel, Manager.
- Mar. 6-13—Greenville, S. C. Carolina Automobile Show. Greenville Dealers' Assn. Textile Hall.
- Mar. 7-13—Muskegon, Mich. Automobile Show, Muskegon Auto Business Men's Assn. J. C. Fowler, Manager.
- Mar. 8-13—Indianapolis, Ind. Annual Automobile Show, Indianapolis Auto Trade Assn., Manufacturers' Bldg. State Fair Grounds. John B. Orman, Manager.
- Mar. 10-13—Lebanon, Pa. Annual Motor Show. Automotive Trade Association of Lebanon. James Furniture Store-Bldg. J. Paul Enck, Manager.
- Mar. 12-20—Boston, Mass. Annual Automobile Show. Mechanics' Building.
- Mar. 15-20—Great Falls, Mont. Automobile Show. Montana Automobile Distributors' Association.
- Mar. 20-27—Trenton, N. J. Annual Automobile Show. Armory. Trenton Automobile Dealers' Assn. John L. Brock, Manager.
- March 20-27—Pittsburgh. Motor Square Garden. Automotive Association, Inc. John J. Bell, Manager.
- Mar. 22-27—Oklahoma City, Okla. Annual Automobile Show. Oklahoma City Motor Car Dealers' Assn. G. W. Woods, Manager.

FOREIGN SHOWS

- Feb. 22-28—Ottawa, Ontario. Motor Show.
- Feb. 22-March 6—Birmingham, England. British Industries Fair.
- March—London, England. Motor Boat Marine and Stationary Engine Exhibition.
- March—Adelaide, Australia. All Australian Exhibition of motor vehicles, airplanes, engines and automotive equipment.
- March 1-15—Lyons, France. Automotive Products, Lyons Industrial Fair.
- April or May—London, England. Commercial Vehicle Exhibition. Olympia.
- April 3-May 4—Buenos Aires. Exposition of U. S. manufacturers.
- July—London, England. International Aircraft Exhibition. Olympia. The Society of British Aircraft Constructors.

TRACTOR SHOWS

- Feb. 2-14—Wichita, Kan. Tractor and Farm Machinery Forum, Wichita Thresher-Tractor Club.
- Feb. 16-21—Kansas City, Mo. Fifth Annual Kansas City Tractor Club. Guy S. Hall, Manager.

CONTESTS

- August, 1920—Paris, France. Grand Prix Race. Sporting Commission Automobile Club of France.
- June, 1920—Omaha, Neb. Reliability Truck Tour.

CONVENTIONS

- May 13-20, 1920—San Francisco. Seventh National Foreign Trade Convention.

S. A. E. MEETINGS

- Feb. 12—Kansas City, Mo. Tractor Dinner. Hotel Baltimore.
- Feb. 20—Cleveland Section Meeting, Hotel Statler. Subject: "Commercial Possibilities of the Airplane."

Prices on Marmon

Models Raised \$350

NEW YORK, Feb. 5—The Nurdyke & Marmon Co. has announced price advance on cars and chassis of \$350, effective Feb. 2. This puts the Marmon 34, 7 and 4 passenger touring cars and the 4 passenger roadster at \$5,000 each f.o.b. Indianapolis. The coupe is \$6,100, the sedan \$6,600, and the limousine and town-cars \$6,800 each.

ELECT TRUCK CO. OFFICERS

MENOMINEE, MICH., Jan. 31—Menominee Truck Co. has elected the following officers: Anton Kuckuk, president; W. A. Holt, vice-president; James A. Hall, secretary, treasurer and general manager.

JOINS NEWARK COMPANY

NEWARK, N. J., Feb. 2—R. A. Denillers, until recently chief tool engineer with the New Process Specialty Co., Milwaukee, has joined the Gould-Eberhardt organization of Newark, N. J., as tool supervisor.

Kissel Distributer

in New York to Build

NEW YORK, Feb. 6—The Sidney B. Bowman Automobile Co., New York distributor of Kissel cars and trucks, has completed plans for the erection of its own building to cover the entire Broadway frontage of the block between 131st and 132d Street. The building is to

be four floors and basement providing total floor space of 100,000 sq. ft., for an up-to-the-minute sales and service headquarters.

The salesroom is being designed especially to accommodate the Kissel trucks. The main passenger car salesroom of the Sidney D. Bowman company will be continued at 1672 Broadway, corner of Fifty-second Street, but an additional salesroom for the passenger car will be provided in the new building.

TO MAKE RUBBER GOODS

MILWAUKEE, Feb. 2—Inner tubes made from a patented rubberized fabric, boots for spare tires, and a variety of automotive specialties will be added to the line of production of the Burlock Rubber Clothing Co.